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THE BRITISH PTERIDOLOGICAL SOCIETY

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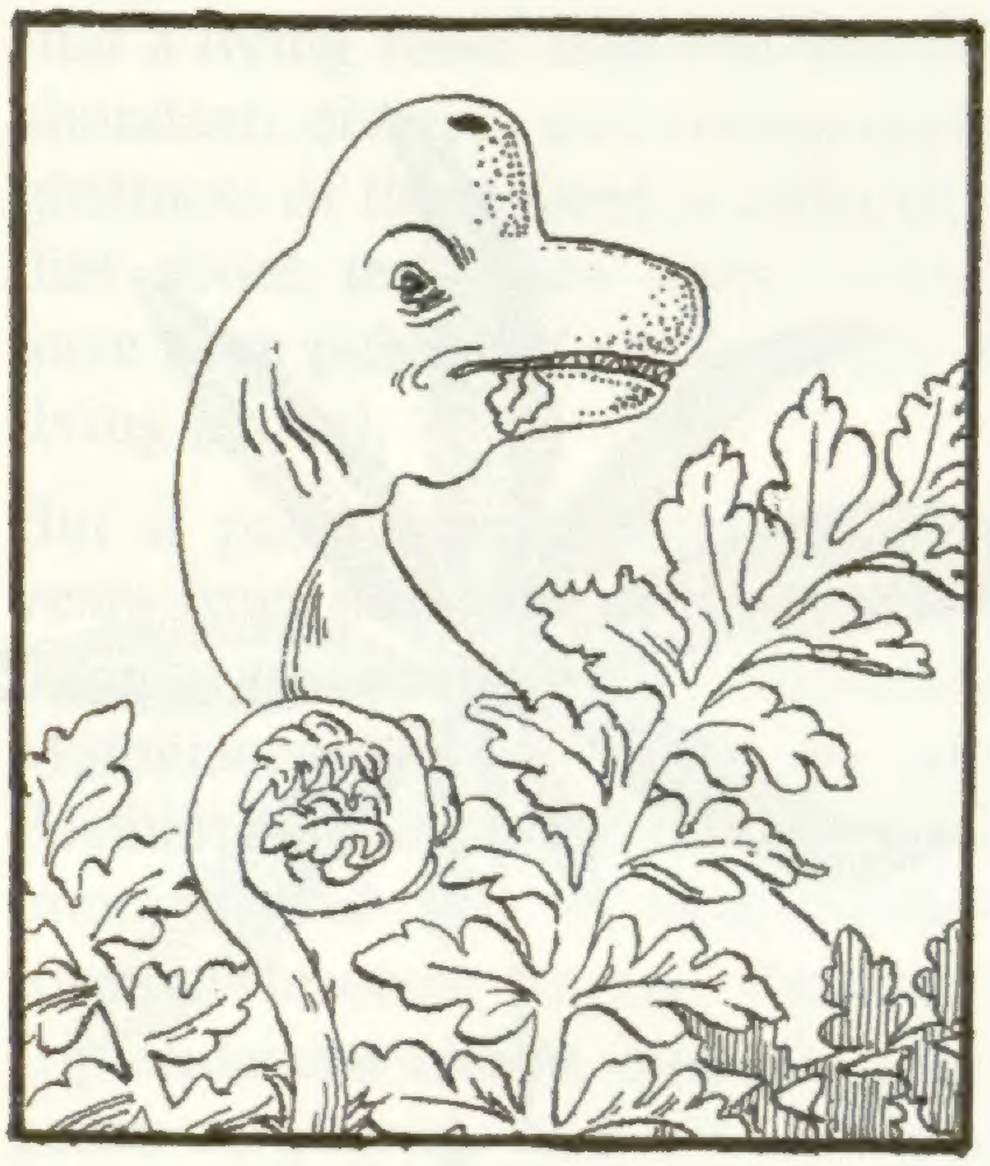
[Front cover: *Dryopteris expansa* growing at Lian, Norway]

ORIGINAL VIGNETTES BY MICHAEL HILL

Back numbers of the *Fern Gazette, Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, from whom further details can be obtained.

MISSOURI BOTANICAL

JUN 18 1996



HANGERS-ON FROM THE MESOZOIC

Robbin C. Moran

In 1928, Oene Posthumus, a Dutch pteridologist and paleobotanist, made a startling discovery. While examining herbarium specimens at the Botanical Garden in Bogor, Java, he came across an unusual fern from New Guinea and realised that it represented a new species of *Dipteris* (family Dipteridaceae). But that wasn't all. From his knowledge of paleobotany he also realized that the specimen was a dead-ringer for a Mesozoic fossil fern, one that had presumably been extinct for millions of years (Fig. 1). As an expert in the taxonomy of living and fossil ferns, Posthumus must have been thrilled by this discovery, for he had simultaneously found a new species *and* a living fossil. He described his findings in an article titled *"Dipteris novo-guineensis*, ein 'Lebendes Fossil'".

Although Posthumus' discovery was remarkable, his chances of finding a living fossil among the Dipteridaceae were excellent, and they would have been equally good in the closely related Matoniaceae. These two families are represented by abundant fossils in rocks of the Mesozoic Era, a time popularly known as the Age of Dinosaurs (their fossils have not been found in older rocks). During that time, which lasted from 225 to 65 million years ago, the two fern families reached their zenith. They thrived as dominant, herbaceous, ground-layer plants and were very diverse: the

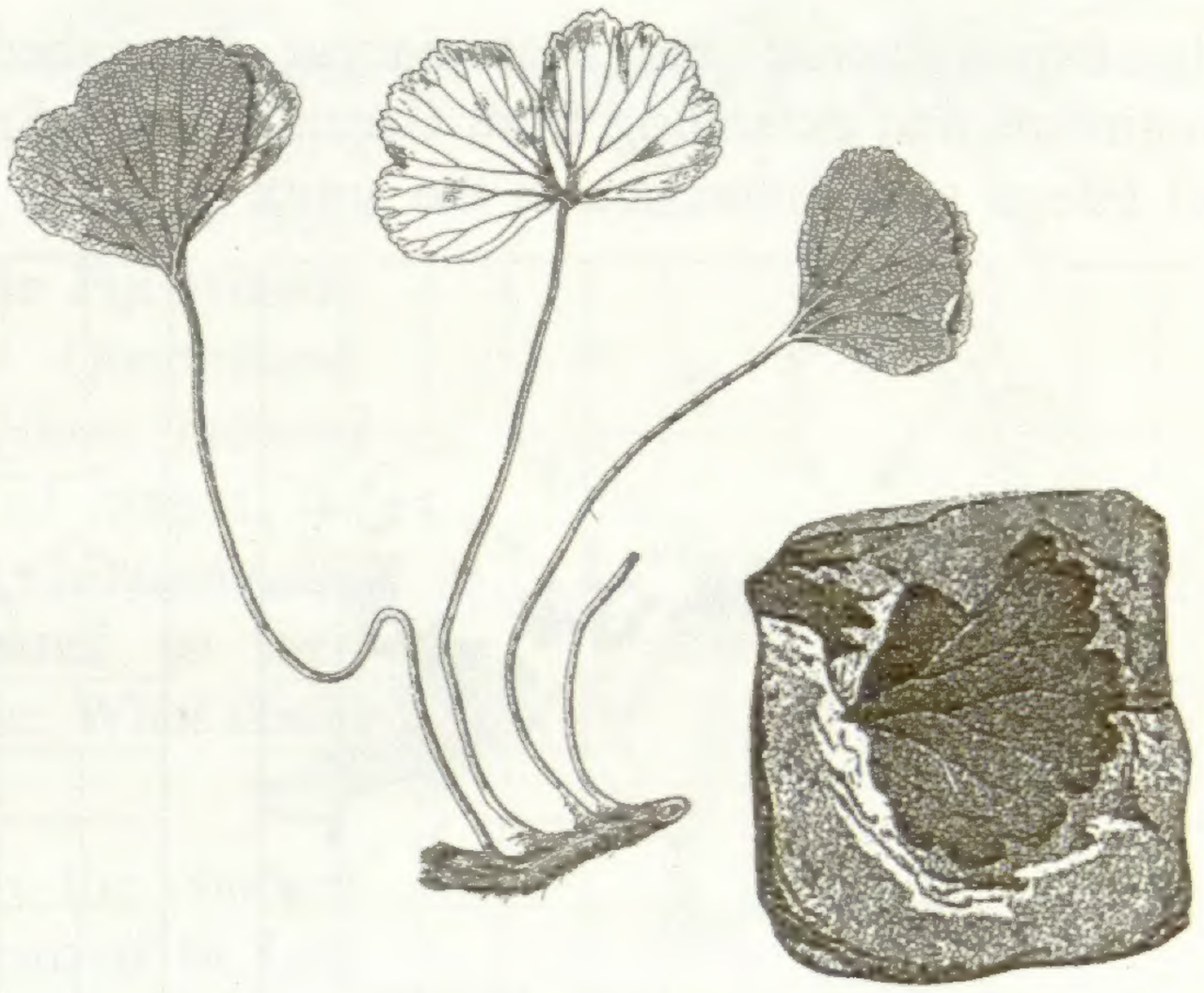


Fig. 1. *Dipteris novoguineensis* and the Triassic fossil *Hausmannia crenata* (lower right). The fossil shows only the right half of the leaf blade.

Fig. 2. ***above, left*** Reconstructions of the leaves of three fossil Dipteridaceae. top: *Clathopteris meniscoides*; middle: *Hausmannia dentata*; bottom: *H. nariwaensis*. (from Ôishi & Yamasita, 1935).

above, right Reconstruction of *Phlebopteris smithii*, the oldest (Late Triassic) fossil species of the Matoniaceae. The distinctive division of the leaf blade allows the fossils to be assigned to the family with a high degree of certainty. (Redrawn from Ash *et al.*, 1982).

Dipteridaceae boasted 6 genera and at least 60 species, the Matoniaceae 8 genera and 26 species (Fig. 2).

The Dipteridaceae and Matoniaceae flourished worldwide, occurring on all continents and extending from Greenland and Spitsbergen in the north to Tierra del Fuego and Antarctica in the south (Fig. 3). What better group in which to

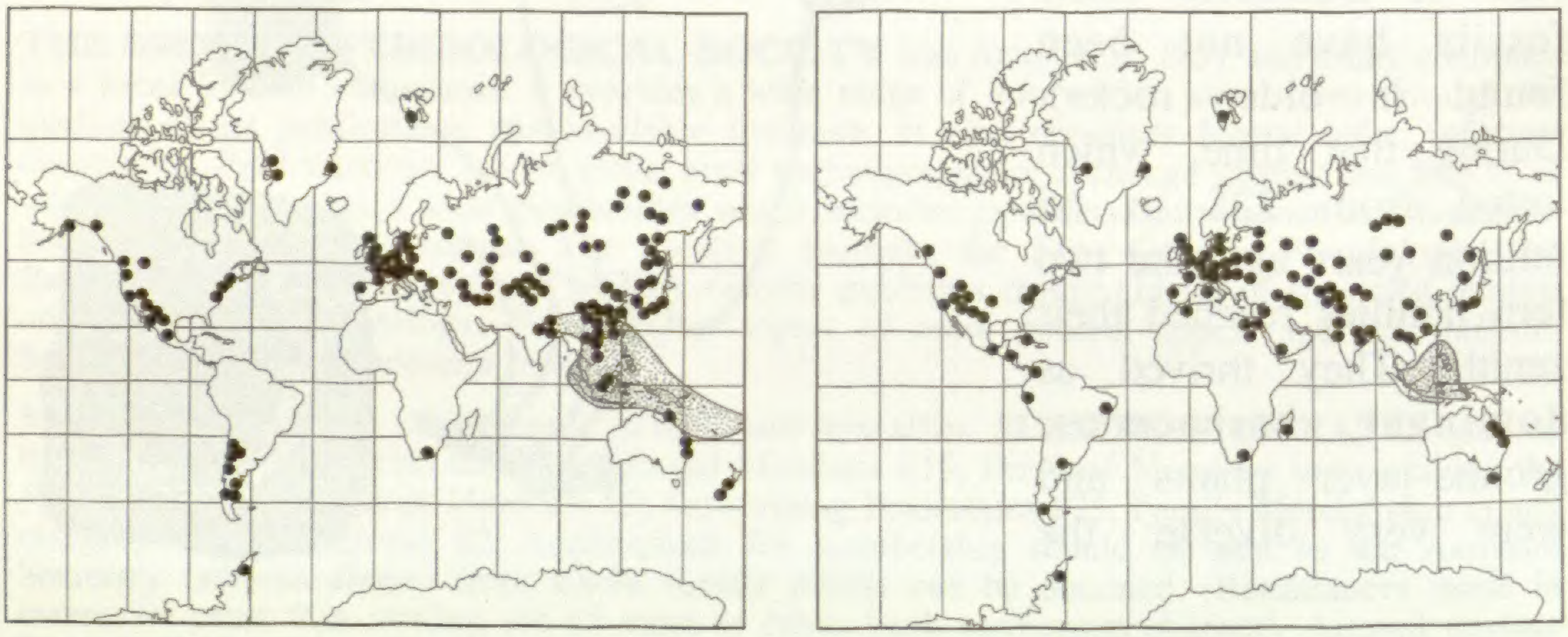


Fig. 3. The past and presnt distribution of the Dipteridaceae *left* and the Matoniaceae *right*. The dots are mesozoic fossil localities, the shaded area the present-day range.

find a living fossil than one that was formerly abundant, diverse, and widespread? (The past greatness of these ferns is reflected by the fact that about ten times more scientific papers have been published on the fossils than on the living plants).

But if paleobotanists are around millions of years from now, and if they are searching for fossils of present-day Dipteridaceae and Matoniaceae, they won't be as lucky as Posthumus. Nowadays the two families are an impoverished lot, a mere vestige of their former Mesozoic vigour. Taxonomically, the Dipteridaceae claims only six species in one genus (*Dipteris*), and the Matoniaceae only four species in two genera (*Matonia* and *Phanerosorus*). That means that for every one living species there are about nine fossil ones. Besides being fewer, the living species are far less diverse morphologically than the fossils, especially in the form and dissection of the leaf blades.

The families today are also less widespread geographically. They no longer occur worldwide but are restricted to southeastern Asia (Fig. 3, shaded areas). One genus, *Phanerosorus,* is found only on Borneo and several small islands off the west coast of New Guinea. Another genus, *Matonia,* is limited to the Philippines, the Malay Peninsula, and Borneo. *Dipteris,* which has a range encompassing the others, occurs from northeastern India to Taiwan, the Fiji Islands, New Caledonia, northeastern Queensland, Malaya, and Thailand. Given their reduced number of species with restricted ranges, the present-day Dipteridaceae and Matoniaceae are clearly depauperate compared to their former opulence in the Mesozoic. What could have caused their demise?

One explanation is suggested by the changes in species composition that occurred in Late

Fig. 4. ***above*** *Dipteris conjuga* and ***below*** *Matonia pectinata*, the most widespread, present-day species of the families Dipteridaceae and Matoniaceae.

Mesozoic forests and by the kinds of habitats where the Dipteridaceae and Matoniaceae occur today. The Early and Middle Mesozoic forests were dominated by gymnosperms such as conifers, ginkgoes, bennettites (cycadeioids), and cycads. Tree ferns representing the Dicksoniaceae were also present but fewer. These plants generally had either palm-like or spire-shaped crowns and did not cast a dense shade. They therefore tended to form semi-open forests where plenty of sunlight reached the ground, and it was in these forests that the Dipteridaceae and Matoniaceae luxuriated for millions of years. Besides forests, the two families probably dominated open habitats along with other ferns, forming a continuous cover to create veritable "fern prairies" (grasses and sedges, which abound in open areas today, had not yet evolved).

The present-day species of Dipteridaceae and Matoniaceae still grow in open or semi-open places as their ancestors did millions of years ago. For example, *Dipteris conjugata* and *Matonia pectinata* (Fig. 4), the two most widespread species in these families, flourish on exposed mountain ridges, forest edges, and clearings. One place where these two species grow together, as their ancestors did during the Mesozoic, is Mt. Ophir in the Malay Peninsula. The ferns' habitat there was described by English naturalist Alfred Russel Wallace (co-developer with Darwin of the theory of evolution by natural selection) in narrating his ascent of the mountain:

> "After passing a little tangled jungle and swampy thickets, we emerged into a fine lofty forest pretty clear of undergrowth, and in which we could walk freely. We ascended steadily up a moderate slope for several miles, having a deep ravine on the left. We then had a level plateau or shoulder to cross, after which the ascent was steeper and the forest denser till we came out upon the "Padang-Bata," or stone-field.... Parts of it were quite bare, but where it was cracked or fissured there grew a luxuriant vegetation, among which the Pitcher plants were most remarkable.... A few Coniferæ of the genus *Dacrydium* here first appeared, and in the thickets, just above the rocky surface, we walked through groves of those splendid ferns, *Dipteris Horsfieldii* [= *D. conjugata*] and *Matonia pectinata*, which bear large spreading palmate fronds on slender stems [petioles], 6 or 8 feet high".

Like the *Dipteris* and *Matonia* observed by Wallace, the two species of *Phanerosorus* also grow in open habitats, usually limestone cliffs and often in full sun. In fact, nearly all species in the two families avoid shady habitats, preferring instead lightly shaded forests or sunny places.

But in the Late Mesozoic the forests began to change. The original gymnospermous trees were gradually replaced by newly evolved angiospermous ones, and the forest floor environment, where the Dipteridaceae and Matoniaceae had thrived, changed for ever.

Unlike earlier forests, the new angiosperm dominated ones displayed multiple layers of vegetation that cast a dense shade. The uppermost layer, or canopy, was 30-40 m high with broad tree crowns tightly packed to catch as much light

as possible. Beneath it thrived an irregular layer of trees and shrubs, and beneath them a sparse herbaceous layer populated the forest floor. On trunks and canopy branches flourished flowering-plant epiphytes, vines and lianas, each intercepting their share of sunlight and helping create a dark world on the forest floor below. In tropical rainforests today, for example, the ground usually receives less than 1% of the light above the trees. Thus, as angiosperms replaced gymnosperms in the Late Mesozoic, the open and semi-open forests were replaced by deeply shaded ones.

The time of this replacement corresponds to a decline in the fossil record of the Dipteridaceae and Matoniaceae. Their number of species and abundance in the vegetation plummets, so that during the last Period of the Mesozoic (the Late Cretaceous) and afterwards in the Cenozoic, they are virtually unknown. This suggests that the rise of the new, angiosperm-dominated forests fostered the decline of the two families. It's as if the two families, after having thrived for millions years in semi-open gymnospermous forests, could not adapt to the new forest environments.

But the rise of angiosperms alone is probably not the whole answer to the mystery of the ferns' decline. Such a drastic event as the limitation of a once abundant and worldwide group of ferns to a few species in south-eastern Asia, and not somewhere else, must have entailed other factors. Nevertheless, the family's preference for open and semi-open habitats provides persuasive evidence for granting a major rôle to the basic factor of shading by angiospermous trees.

If there's ever an example of the importance of fossils in understanding present-day life on earth, it is the Dipteridaceae-Matoniaceae story. Their past species richness, their former world-wide distribution and abundance in the vegetation, and their decline as angiosperms rose to dominance at the end of the Mesozoic - all this is revealed by fossils. Like Oene Posthumus, we too have reason to rejoice over plant fossils from the Mesozoic.

Selected References and Notes

Oene Posthumus described his new species and compared it to the fossil *Hausmannia crenata* in "*Dipteris novo-guineensis*, ein 'Lebendes Fossil,'" *Recueil des Travaux Botaniques Néerlandais* 24: 244-249 (1928).

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The plants in Figure 2 (left) were taken from **Saburô Ôishi and Kazuo Yamasita**, "On the Fossil Dipteridaceae," *Journal of the Faculty of Science Hokkaido Imperial University* series 4, Geology and Mineralogy 3(1): 135-184.

Figure 2 (right) is redrawn from **Sidney Ash, Ronald J. Litwin, and Alfred Traverse**, "The Upper Triassic Fern *Phlebopteris smithii* (Daugherty) Arnold and its Spores," *Palynology* 6: 203-219 (1982).

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The distributions of fossil Dipteridaceae and Matoniaceae (Fig. 3) were compiled from **Paule Corsin and Michel Waterlot**, "Paleobiogeography of the Dipteridaceae and Matoniaceae of the Mesozoic," Fourth International Gondwana Symposium 1: 51-70 (1979). *[N.B. there are three dots on the U.K. They are for fossils found in Dorset, North Yorkshire and at Brora on the east coast of Scotland, the last researched by Marie Stopes in her youth! There are representatives of both families here, and some of the genera mentioned in this article - ed]*

The habitats of *Dipteris conjugata* and *Matonia pectinata* are described by **Richard E. Holttum**, *Flora of Malaya,* Volume 2, *Ferns,* ed. 2 (Singapore: Government Printing Office, 1968). The quotation of **Alfred Russel Wallace** was from his book *The Malay Archipelago* (London, 1886). The limestone cliff habitat of *Phanerosorus* was studied by Trevor G. Walker and A. Clive Jermy, "The Ecology and Cytology of *Phanerosorus* (Matoniaceae)," *Fern Gazette* 12: 209-213 (1982).

Until recently, American pteridologist Robbin Moran worked at the Department of Systematic Botany at the University of Aarhus, Denmark with Benjamin Øllgaard. He is a prolific writer about all aspects of fern biology and I have a great heap of his splendid articles, first printed in the American fern journal Fiddlehead Forum. *I intend to bring you more from Robbin in future editions of* Pteridologist, *but the problem is perplexing: which to choose for 1987? - ed.*

A medecyne to purge the bladder of him that cannot pisse

Take fennell the leaves and the rootes, alleydanders, parceley the leaves and rootes, hartstonnge, mayden heare, and seethe them in white wyne, and give to hem to drinke. It shall purge the bladder in a short tyme.

An easy purgation

Take a pynte of white wyne, one ounce of serce and a goode handfull of reysons of he sonne, the stones beinge takinge out, and halfe sponefull of annyseedes. Put all theis in the said white wyne a whole nighte, and the nexte morning, boile it to a draught, and soe let hem drinke it bloode warm. And yf you will you maie putt thereinto iij or iiij rootes of polipodion of the oke.

Book of sovereigne medicines againste the most common and knowne diseases, chefely for the poor, who have not at all tymes the learned phisitions at hande.

Abbott Feckenham, 1515-1584

ASPLENIUM MARINUM IN IONA ABBEY

Adrian Dyer

Asplenium marinum (sea spleenwort) is quite common round the rocky south and west coasts of the Isle of Iona, off the south-west tip of Mull, Argyll. It is also found on the walls of several medieval ruins on the island, together with *A. ruta-muraria*, *A. trichomanes* subsp. *quadrivalens* and, occasionally, *A. adiantum-nigrum*. These ruins occur in and around the village and restored Abbey within 300 m of each other and 50-100 m from the sheltered east shore. Perhaps surprisingly, *A. marinum* on Iona is absent from the more recent mortared walls around the village, even when the other *Asplenium* species are present. The nearest natural populations of *A. marinum* are 700 m to the south and west.

This article is mainly concerned with about ten plants of *A. marinum* which are growing on walls <u>inside</u> the Abbey. All but one are on the south wall, most of them in the choir (sanctuary), near the altar, and the remainder at the other end of the nave, near the font. There are no other ferns or angiosperms growing on these or any other walls within the Abbey, and the outer walls are free of vascular plants. The sea spleenworts grow out through cracks in the cement mortar pointing. All those that could be examined at close quarters proved to be fertile. The largest plant (possibly a clump of two or three plants) was a conspicuous feature of the south wall of the choir in 1995. It is growing out of a niche about 4 m above floor level over the triple sedilia. The fronds were so much larger than any I had previously seen on a sea spleenwort that I was not convinced of its identity until I had obtained a ladder for a closer look (above). I collected one of the larger fronds (now in the

Herbarium at the Royal Botanic Garden Edinburgh [RBGE]) and it measured 47 cm in length (32 cm lamina + 15 cm stipe) with pinnae up to 4.5 cm long. I then became interested in a number of inter-related questions about this specimen. Was it an unusually large specimen for this species and, if so, was it a genetically distinct form or a consequence of the conditions in which it was growing? How and why was this fern growing inside the Abbey, and how long had it been there?

The size of *Asplenium marinum* fronds

Most of the floras agree that, even under exceptionally favourable conditions, the maximum length of frond or leaf (implying that the measurement includes lamina and stipe) is 40 or 40 cm (of which about one third is stipe). Roger Phillips in *Grasses, Ferns, Mosses and Lichens of Great Britain and Ireland* (1980) give 50 cm as the upper limit, while all editions of *The Flora of the British Isles* (Clapham, Tutin and Warburg), and *Collins Guide to the Ferns, Mosses and Lichens of Britain and Northern and Central Europe* (Jahns, 1980), add "(-100)", indicating that exceptional specimens of 1 m long have been recorded. Although hard to believe, this may be a legacy of a statement by Moore (*The Nature Printed Ferns of Britain and Ireland*, 1855) that this species is "occasionally upwards of a yard long", supported by a report of a specimen from Guernsey (Channel Islands) with a 34" (85 cm) frond, including a 24" (60 cm) lamina with 2½" (7.5 cm) long pinnae. The largest specimen illustrated (nature prints are life-size) is from Jersey and has a lamina length of 13½" (34 cm), corresponding to a frond length of approximately 20" (51 cm).

Further information can be obtained from herbarium collections. Examination of the 128 different collections in the RBGE herbarium confirmed that the Iona plant is exceptional, but not unique. Four of the collections, one from Ireland and three from Cornwall, include longer fronds. (I measured only the lamina because some of the stipes were incomplete). The longest had a lamina of 45 cm, corresponding to a frond length of about 68 cm. The longest Scottish specimen, from Galloway in south-west Scotland, was almost as long (31.5 cm) as that from Iona Abbey. There was, however, only one frond (from Cornwall) with longer pinnae (maximum of 5.5 cm cf. 4.5 cm). Thus, the Iona Abbey specimen is one of the largest recorded for the species and, subject to a search in other herbaria, perhaps the largest for Scotland.

Of the eleven fronds in the RBGE herbarium with lamina longer than 30 cm (corresponding to a frond length of about 45 cm), ten were from Ireland, Cornwall and the Channel Islands; the other one was the Galloway specimen referred to above. It is perhaps significant that they were all from the south-west fringe of Britain and Ireland. All the specimens from east, south-east and north-west England were considerably smaller. Back in 1840, Newman (*History of British Ferns*) also recorded that specimens from Cornwall were larger than those from northern counties. Whether or not potentially larger ecotypes occur in climatically more favourable areas, there certainly seem to be environmental factors within individual protected microhabitats which allow the expression of the full growth potential impossible to achieve in more exposed

sites; some of the floras refer to the largest specimens being in sheltered crevices. The sheltered microhabitat of the Iona Abbey plant might well explain why it had been able to grow much larger than plants outside the building. Greater age, or easier access to water or nutrients, might explain why it was bigger than other plants also growing inside the Abbey. As Iona has a very oceanic climate, it is also possible that it shares, with other localities around the south and west fringe of Britain, an ecotype which has greater potential for growth in favourable conditions than other ecotypes from north and east coasts. A comparison of sporophytes grown, under similar controlled conditions, from spores taken from the largest and smallest fertile plants on Iona and on selected Cornish and east coast populations would help to separate the genetic and environmental components of the observed size variation.

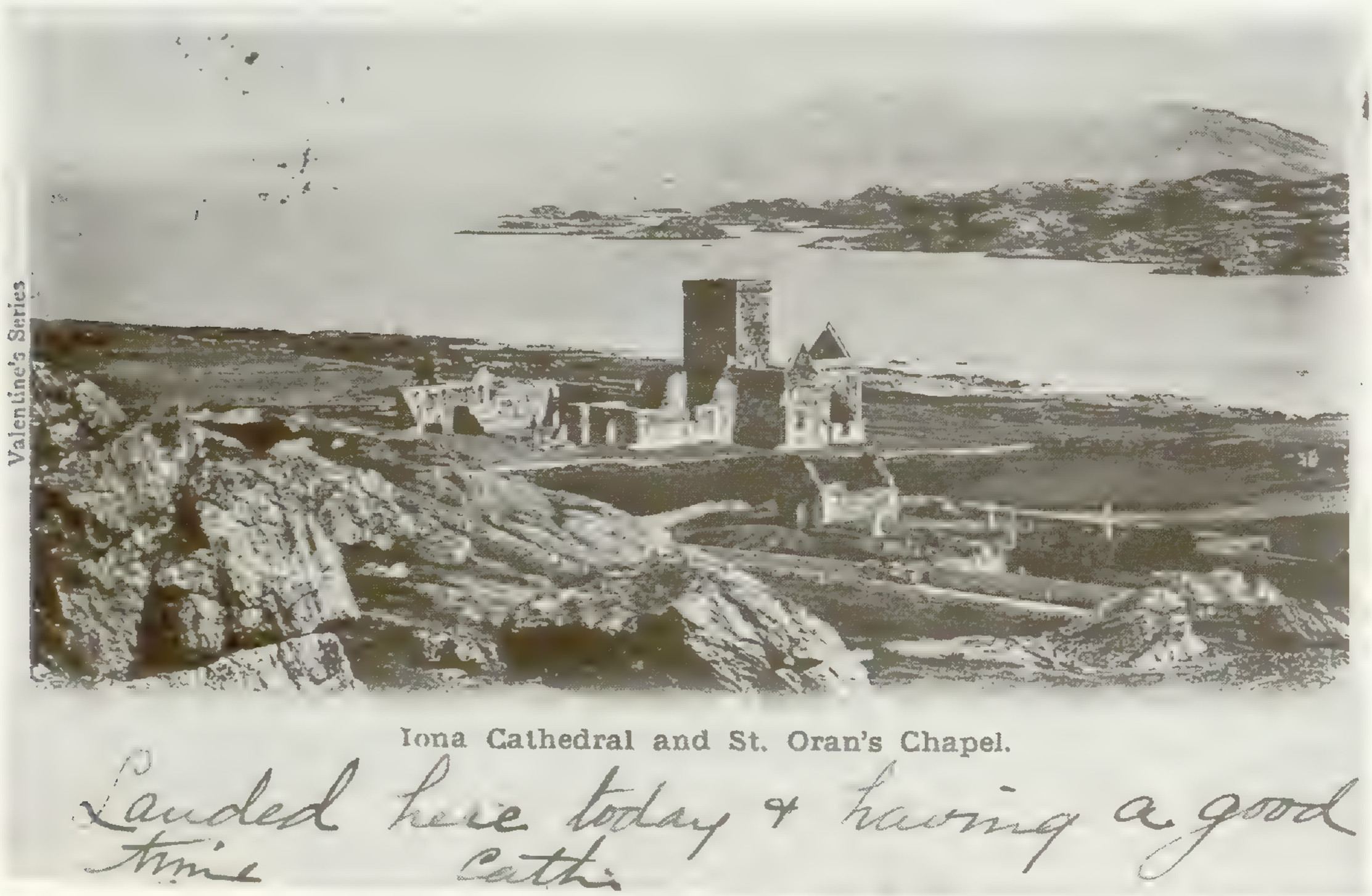
All eleven longest specimens in the RBGE herbarium were collected in the mid- to late 19th century. This may mean nothing, though it is conceivable that the oldest individuals or the genotypes with the greatest potential size were selectively removed by collectors, or that climatic changes have had an adverse effect. The longest recent specimen, dated 1993, had a lamina of 27 cm and was from Kirkudbrightshire in south-west Scotland.

The RBGE collection implies that 8.5% of plants are of exceptional size (i.e. lamina longer than 30 cm) but field experience indicates that this is unlikely to be a true reflection of the natural frequency of these large specimens. Hundreds of plants of this species can be observed without seeing one which even approaches this length. However, when discovered, exceptionally large specimens are likely to be preferentially collected, ignoring the nearby more typical fronds and other populations in the same general area with no remarkable specimens. Thus they may even be atypical of the localities in the south and west where they were collected, just as the frond I collected was atypical of the other plants in the Abbey and elsewhere on Iona.

The origin of *Asplenium marinum* in Iona Abbey

I first noticed some of these plants more than ten years ago. Precise information relating to the 1970s and earlier is difficult to obtain. Reliable anecdote, herbarium specimens and dated photographs are possible sources. Maintenance staff at the Abbey confirmed that they had been aware of them for several years, though they seemed to have grown more luxuriantly in 1995 than they could remember previously. James Merryweather reports that sea spleenwort grew in the Abbey in 1974. Herbarium records have not yet provided any earlier dates; there are no specimens since 1829 from Iona Abbey in the Edinburgh herbarium. Because of the tourist interest in the Abbey, dateable photographs, including interiors of the choir, are more readily available, for example as illustrations in guide books. Photographs have the potential advantage of revealing precise locations of the plants; one of the neighbouring plants, close to the wall niche, appears to be present in a photograph in an HMSO guide book published in 1993. However, photographs do not always show sufficiently clear detail; illustrations in two other guide books dating from the 1970s and 1980s which show the niche are inconclusive regarding the plants. They are certainly

not as conspicuous as in 1995 but, of course, they might have been "tidied up" periodically during maintenance work. I have not yet been able to examine any guide books dated prior to 1970. A photograph dated 1906 in Hannam's *IONA: and some satellites* (published some time after 1927) is equivocal; a slight irregularity in the outline of the niche could mean anything or nothing. Attempts to obtain dated postcards or unpublished photographs of the choir have not yet been successful. Consequently, the history of these plants in the Abbey must be a matter of speculation supported by a little circumstantial evidence.



Iona Cathedral and St. Oran's Chapel.

Landed here today & having a good time

The existing walls of the choir of the Abbey were built in the second half of the 15th century during a period of major reconstruction by Abbot Dominic. During the 17th century, the buildings fell into ruin. A print of 1761 shows the choir walls intact up to roof level and along its length all the way to the transepts, but the whole of the roof is missing. There was some consolidation of the ruins in the 1870s but a postcard postmarked Aug. 13, 1902 (above) shows the building in the same condition, roofless but with intact walls. However, it was in 1902 that restoration began and the choir was one of the first parts of the Abbey to be re-roofed later that year. The cement mortar pointing over the original lime mortar probably, therefore, dates from 1902, though there may have been further maintenance work since. The walls on which *A. marinum* now grows within the Abbey were, therefore, open to the elements for up to 300 years before being enclosed within the restored building for over 90 years.

When I came to position my camera so as to obtain the same image as in the postcard, including the rocks in the foreground, I found I was standing on the only piece of level ground in the area large enough to take the wooden tripods used at the turn of the century. Almost certainly, I was standing on the same

spot as the Victorian photographer (see below). So, how did the plants become established on the inner walls? The possibility of recent colonisation by spores blown in from nearby fertile plants growing outside cannot be discounted, but it is not obvious why this should involve only one species and only occur along one side of the Abbey; condensation, the probable source of the moisture which sustains the plants, can be seen on other walls as well.

There is an attractive alternative explanation. The plants might have become established in the old lime mortar while the building was roofless, survived the renovation work and then grown out past the new pointing. There is evidence that *A. marinum* grew on the ruins. There is a small (8 cm lamina) specimen dated July 8, 1829 from the "ruins of the Cathedral" on Iona in the Edinburgh herbarium, and Newman (1840) states that *A. marinum* "almost covered the old Cathedral". It may also be significant in this regard that all but one of the plants now inside the Abbey are on the south wall of either the choir or the nave, the inner faces of which, of course, face north. Despite the reputation this species has for being frost sensitive (see *A Natural History of British Ferns*, Page, 1988), plants growing on outside walls on Iona have a preference for the northerly aspect. Recent observations on the ruins of the nearby Nunnery, St Mary's Chapel and the house of the Bishop, all of which have remained roofless for about 300 years, have shown that *A. marinum* is limited almost exclusively to north-facing surfaces. It is common, sometimes outnumbering all other plants, on walls facing between WNW and NE, rare on walls facing east, and absent from other surfaces. There are several free-standing walls where sea spleenwort is present on the side facing approximately north, but absent from the side facing south, which is a strong indication that it is responding to aspect and not to substrate. Several other fern species and angiosperms growing on the same walls showed no clear preference for a particular aspect. Most of the

plants of *A. marinum* observed growing on natural substrates round the island's coast also occurred on rock faces with an approximately northerly aspect, but no detailed survey was made to confirm whether this was a clear preference for such sites to parallel the situation on the ruin walls. It would be interesting to discover whether this apparent preference for a northerly aspect is a local feature reflecting conditions in and around Iona village or a widespread species characteristic. If the latter, it might be expected that, because sea spleenwort usually grows close to and facing the sea, the occurrence of the species on south-facing coasts would be restricted.

In view of these observations, the plants now growing inside the Abbey could be the survivors of a population established on the north-facing wall surfaces of the open ruin before 1902. The absence of plants on north-facing outside wall surfaces can be explained by the active cleaning and pointing programme which is maintaining a weather tight surface. The plants on the inside are cherished by the residents of the Abbey community and, currently at least, tolerated by the maintenance staff.

This explanation would require that the sea spleenwort plants in the Abbey are more than 93 years old and have survived re-pointing. This does not seem improbable. Although little is known about fern sporophyte longevity in general, I know of individual plants of *Dryopteris affinis*, *D. filix-mas* and *Athyrium filix-femina* which are still enlarging after more than three decades, and potential survival for many decades and probably over a century is indicated. Page (*Ferns of Britain and Ireland*, 1982) refers to plants of *Osmunda regalis* known to have lived for over a century and estimated to be several centuries old. No doubt longevity varies between species but, in the absence of evidence to the contrary, the possibility of survival of *A. marinum* for a century or more cannot be ruled out. Survival of established rhizomes after being covered by new pointing, followed by re-emergence of the fronds that have forced their way through or around new mortar, is not infrequently observed for *A. ruta-muraria*. More difficult to account for is the absence of any other fern species along with *A. marinum* on the inside walls. It could be that no other species were present at the time of re-roofing (see Newman's remarks of 1840 above), or it might be that the mortar does not provide a suitable substrate for other ferns. Both of these explanations seem unlikely in view of the regularity with which *A. marinum* is accompanied by other *Asplenium* species on other Iona walls. Perhaps the most likely explanation is that *A. marinum* is the most long-lived of these species, at least under the conditions inside the Abbey. It is, of course, possible that the original survivors died during the last 93 years and have been replaced by plants established from their spores, but until there is evidence to suggest this, such as the recent appearance of juvenile plants at sites on the wall not previously occupied, the simpler hypothesis that the existing plants have remained as live rhizomes within the old mortar for all that time is favoured.

If anyone has information on the maximum size and age of *A. marinum*, on its preference for walls or natural substrates with a particular aspect or composition, or on the plants of Iona Abbey, I would be very interested to receive it.

ADRIAN DYER

FERNS FOR THE ALPINE GARDENER

A R Busby

I use the term 'alpine garden' in its widest sense to include sinks, troughs, rockeries, scree gardens and alpine greenhouse. I must also define the difference between 'alpine ferns' and ferns for alpine gardens. Alpine ferns are ferns whose true home is the fissures, screes and limestone pavements of high altitude. On the other hand, ferns for alpine gardens might be any hardy or near hardy fern that grows to less than 15-30cm. Ferns can be found from the high mountains down to within splashing distance of the sea. Many of these ferns are not 'montane' but due to their short stature, they are eminently suitable for inclusion in our 'alpine' collections.

Let us first consider the true alpine ferns. If we are to cultivate these ferns successfully, we can do no better than to try to emulate the conditions found in their native haunts, so let us consider how and where they live. If we walk amongst the screes and boulders of high places, we will encounter many of the spleenworts in cracks and fissures, on stable screes and in the grykes of limestone pavements.

What does this lifestyle tell us about these ferns' requirements? Firstly, that not all ferns are plants of moist shade. Indeed, many of these montane ferns inhabit some of the most exposed habitats in extremes of heat and cold, yet they are able to obtain some elementary shelter, even if it is only in the shade or lee of a boulder, or by tucking themselves down in the grykes of limestone pavement. Secondly, that the drainage of surplus water is absolute. Even on the hottest day alpines have adapted to survive by exploiting a cool, damp root-run. Thirdly, that the nutrient requirements must be minimal. Not for them the cool, moist, humus-rich soil of a woodland floor. They have adapted to the few major and trace elements provided by small amounts of decaying moss leaves and wind-blown detritus, plus the elements deposited by birds.

I always feel that part of the art and skill of growing ferns is to try and emulate the conditions in which they are found in the wild, or to present the fern in what might be called a miniature landscape. By that I do not mean trying to reproduce Snowdonia in a pot or pan but that the medium the fern is growing in and its overall appearance should reflect how the fern might appear in the wild.

Containers

Alpine growers are masters of pressing into service all sorts of containers, sinks and troughs. I myself have managed to acquire a 5'x 2' clay-washing sink, two saggars from a local art college and a square block of cotswold stone which I was easily able to fashion into a 'trough' with a hammer and chisel.

I have no firm opinions on the merits or otherwise of clay and plastic pots. Crock pots are more aesthetically pleasing and provide good drainage and aeration. However, they do dry out fairly quickly and regular attention to watering is essential if disasters are to be avoided. Plastic pots have been around since the late 1950s and are now much more acceptable. They do prevent plants from drying out too quickly but, if the compost is sticky, overwatering can be a problem.

Compost

The second most important factor in the cultivation of alpine ferns is the choice of compost. (The first is you!) The Dutch commercial growers are able to produce thousands of well-grown *Asplenium trichomanes* in 1 litre pots with a peat-based compost. It is a mystery to me how they manage it. I would not recommend purchasing these with a view to trying either to cram them into small pots or attempting to change the type of compost they are growing in. Better to use them for planting into large sinks or troughs and rely on your own spore-raised plants. They are far more amenable to potting on or coaxing into holes or crevices in tufa.

I am not at all convinced that proprietary potting composts are advisable for our montane ferns; after all, they are adapted to rely on a meagre supply of nutrients. I would consider even John Innes No.1 to be too rich for the cultivation of these ferns. At the risk of upsetting the peatland conservationists (and I am sympathetic to their cause), my experience of coir and coir-based composts has been very unhappy. I consider coir to be dreadful stuff and although it is presented to the gardening public as an alternative for peat, in my experience, it is no substitute.

The British gardener relied on soil-based composts for generations and I see no reason why we should not return to it, subject to certain conditions. After all, soil is plentiful, indestructible and re-usable. Ideally the compost for these ferns needs to provide a cool root run and a few nutrients. I have found that by using an unsterilised light loam and incorporating plenty of sand or grit (1/8th grist) ferns respond well. Try to work out your own formula by trial and error. Loam is extremely variable and loams from different sources will require different treatments to provide the right medium. As a starting point, try 1 part loam or garden soil, 1/2 part sand or grit and 1/4 part peat (by volume). If this recipe proves unsuitable try different proportions.

It is advisable to incorporate limestone grit for those ferns that prefer alkaline conditions, either ground chalk or ground Dolomite limestone which contains magnesium. Use acid grits for the lime-haters. Determine the pH of the soil you are using and avoid using 'limey' soils for lime-hating ferns. If you are potting

up lime-hating species ensure that you are using only lime-free ingredients. If you want to test that any of your ingredients to hand are 'limey', place one or two drops of vinegar on them. Any lime present will declare itself as effervescence.

Always check the pH of your composts to ensure their suitability for the ferns you are potting up. For acid-loving ferns, anything between 5.5-6.5 will be suitable and for those that prefer alkaline conditions the compost should within the range of 7.0-8.5. Adjust your compost by adding peat or dolomite limestone.

This emphasis on home-made composts using various formulae for different species heralds a return to pre John Innes days (1930s) when any gardener worth his salt had his own 'secret' pocket book of seed and potting compost formulae, and buckets of various grits, sands, leafmoulds and pulverised lime mortar, were all part of the potting shed essentials.

Acquiring your ferns

Apart from the illegality and immorality of collecting plants from the wild, trying to extract a fern from the fissure of a boulder or brick wall is virtually impossible and happily, is totally unnecessary. Spores collected fresh and sown immediately should provide plenty of plants to experiment with. Young plants grown from spores are much more amenable to potting on or coaxing into holes in tufa. As a general rule, spores of limestone loving species should be sown in a gritty soil-based compost. Spores of acid loving species can be sown in a compost consisting of 50/50 loam and peat as long as the loam has an acid reaction. It is worth remembering that a soil-based compost is only as good as the soil it is made from.

If you are going to use crock pots, make sure they are scrubbed clean and soaked overnight in a bucket of water. This is especially important if you are using new crock pots. It is also worth considering using the double pot technique. This provides for a cool root run, guards against rapid drying out and provides some protection against the root ball becoming frozen. The pot containing the fern is itself potted up inside another pot two sizes larger, with the inter-pot cavity filled with compost or sand. Alternatively, the pots can be sunk up to their rims in a sand frame, a time-honoured method of growing alpines.

Potting on

So we have mixed our compost, prepared a suitable pot and we have well grown plants established from our spore sowings. Prepare the pot by placing some potsherds (broken crock pot pieces) over the drainage hole and place an inch or two of compost over it. Carefully align the plant in the pot and gently trickle the compost around it. Firm gently. Ensure that the growing point of the fern is slightly proud of the level of the compost. (Remember that these ferns never have water collecting around the growing point). To ensure that the growing point can shed excess water and 'dry out', top dress the compost with grit, gravel or pebbles. Water both fern and inter-pot cavity well. Any

subsequent watering should be done sparingly, so try to keep the compost between damp and moist, never wet; damp in the winter and moist in the summer.

Subsequent care

Using unsterilised soil means you will grow weeds. These are only a minor problem and they are easily pulled out as young seedlings. Mosses present an even smaller problem. I am quite happy for mosses to invade the grit, after all, it is exactly the kind of competition ferns encounter in the wild. If I feel that the mosses are getting out of hand, then they too can be weeded out or just thinned away from the growing point.

Thalloid liverworts are a different matter. Both *Marchantia polymorpha* and *Lunularia cruciata* are real thugs and their blanket thallus will smother and kill most small ferns. They should be removed immediately and regular inspection of the collection is recommended so that the any liverwort invasion can be dealt with as soon as they appear.

I tend to avoid repotting unless the plant has completely utilised all the compost and space that the pot provided. Remember the true alpine ferns tend to feel more secure if they are firmly rooted in a crack or pot. However, once they are pot-bound they are more at risk from drying out. Watering needs to be done with the greatest care.

Although these plants thrive on a minimum of nutrients, some feeding will be necessary. I suggest feeding with any liquid based proprietary feed at half strength. Little and often is the golden rule. Incorporate the feeding with your regular watering pattern and never apply feed to a plant with dry compost.

Ferns in sinks, screes and rockeries will fend for themselves, they require good light and a couple of hours of sunlight in the early morning or late evening will do them no harm. The alpine house may be the obvious place for potted ferns, but the protection of glass is not necessary for most of the year. A simple slat house or shade frame will suffice. Glass structures provide extremes of temperature especially during the summer months. A slat house or shade frame never gets too hot, and an extra layer of 'netlon' will provide some frost protection.

Growing hardy ferns in the herbaceous border, shrubbery or woodland garden requires little skill or effort. Growing alpine ferns which have such specialised cultural requirements presents a much greater challenge and satisfaction to the fern grower.

Further Reading

Rickard M H, *Hardy Ferns for Alpine Gardens*. Alpine Garden Society Bulletin, 59(3), Sept. 1991.

Jones D L, *Encyclopaedia of Ferns*. Natural History Museum, London 1987

For lists of ferns suitable for the alpine gardener see opposite ➪

List 1. Ferns for Rock Gardens, Troughs, Screes and Walls

[key = (a) acid preferred, (l) lime preferred, (*) no preference
(ms) moist shade, (h) humidity, (?) unsure of requirements]

Adiantum aleuticum (*)
Adiantum aleuticum 'Subpumilum'
Asplenium dareoides (*)
Adiantum poirettii (l)
Asplenium adiantum-nigrum (l)
Asplenium x *alternifolium* (a?)
Asplenium cuneifolium (l)
Asplenium ceterach (l)
Asplenium ceterach 'Crenatum'
Asplenium fontanum (?)
Asplenium monanthes (*)
Asplenium ruta-muraria (l)
Asplenium scolopendrium all varieties (l)
Asplenium septentrionale (a)
Asplenium trichomanes (l)
Asplenium trichomanes'Cristatum'
Asplenium trichomanes 'Incisum'
Asplenium viride (l)
Cryptogramma acrostichoides (?)
Cryptogramma crispa (a)
Cystopteris diaphana (?)
Cystopteris dickieana (l)
Cystopteris fragilis (l)
Cystopteris fragilis 'Cristata'
Cystopteris fragilis 'Sempervirens'
Cystopteris montana (l)
Cystopteris regia (?)
Cystopteris sudetica (?)
Dryopteris fragrans (*)
Dryopteris submontana (l)
Dryopteris villarii (l)
Gymnocarpium dryopteris (a)
Gymnocarpium dryopteris 'Plumosum'
Gymnocarpium robertianum (l)
Polypodium cambricum (l)
Polypodium interjectum (*)
Polypodium scouleri (?)
Polypodium vulgare all varieties (*)
Polystichum falcinellum (*)
Polystichum lonchitis (l)
Polystichum rigens (*)
Polystichum setiferum (*)
Polystichum setiferum 'Crispa Congesta'
Polystichum stenophyllum (l)
Polystichum xiphophyllum (?)
Woodsia alpina (a)
Woodsia ilvensis (a)
Woodsia obtusa (?)

List 2. Ferns for Cold Greenhouse and Frame

Adiantum capillus-veneris (l)
Adiantum hispidulum (*)
Adiantum reniforme (?)
Asplenium adulterinum (?)
Asplenium foreziense (?)
Asplenium marinum (*) (h)
Asplenium obovatum (l)
Asplenium onopteris (l)
Asplenium platyneuron (?)
Asplenium pseudofontanum (?)
Blechnum fluviatile (*)
Camptosorus rhizophyllus (*)
Cheilanthes argentea (?)
Cheilanthes distans (?)
Cheilanthes eatonii (?)
Cheilanthes farinosa (?)
Cheilanthes fragrans (?)
Cheilanthes lanosa (?)
Davallia mariesii (*)
Dryopteris fragrans (*)
Gymnopteris vestita (*)
Notholaena sinuata (?)
Pellaea atropurpurea (l)
Pellaea ternifolia (a)
Pellaea rotundifolia (*)
Pellaea viridis (*)
Polystichum mohrioides (*)
Polystichum tsus-simense (*)
Pteris cretica (*)
Woodsia intermedia (*)
Woodsia mollis (l)
Woodsia polystichoides (a)
Woodsia scopulina (*)

Plus all in list 1.
Many of the ferns in list 2 could be tried outdoors in sheltered positions or with the winter protection of a small cloche.

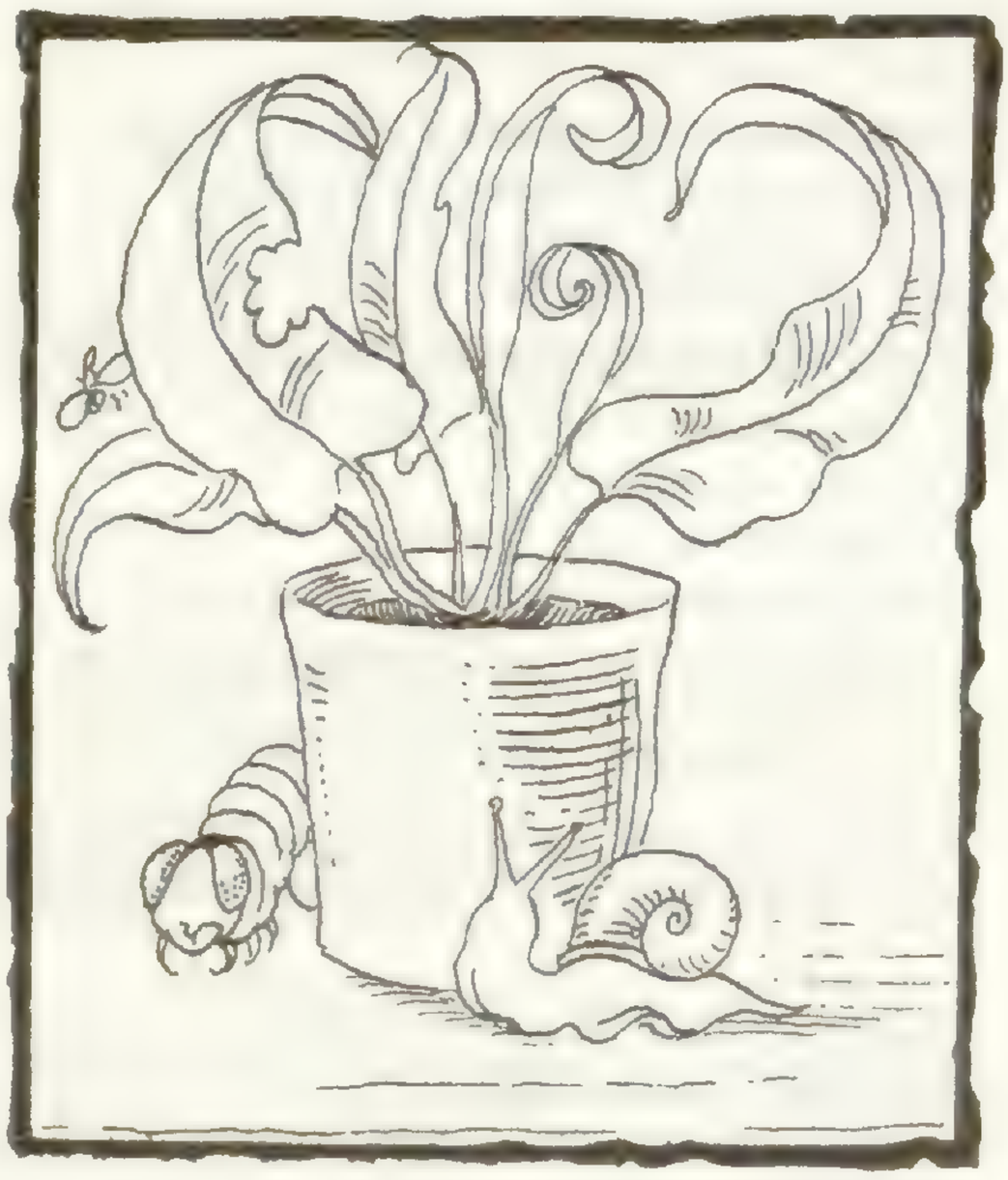
List 3. Alpine Ferns for a Frost Free Greenhouse

The provision of a frost free greenhouse extends the list dramatically. The following are worth trying.

Adiantum edgeworthii (a)
Adiantum jordanii (a)
Adiantum raddianum numerous forms (*)
Anogramma chaerophylla (a)
Anogramma leptophylla (a)
Arachnoides simplicior (*)
Asplenium flaccidum (*)
Cheilanthes spp. (l)
Cystopteris sudetica (*)
Doryopteris pedata (*)
Hemionitis arifolia (l)
Paraceterach spp. (*)
Pellaea hastata (l)
Pellaea sagittata (l)
Pteris cretica all forms (l)

List 4. Other short stature hardy ferns (10-45cm)

Adiantum venustum (*)
Athyrium filix-femina 'Acrocladon' (*)(ms)
Athyrium filix-femina 'Caput-medusae' (*)(ms)
Athyrium filix-femina 'Congestum' (*)(ms)
Athyrium filix-femina 'Frizelliae' (*)(ms)
Athyrium filix-femina 'Minutissima' (*)(ms)
Athyrium niponicum 'Pictum' (*)(ms)
Athyrium otophorum (*)(ms)
Athyrium vidalii (*)(ms)
Blechnum penna-marina (a)(ms)
Blechnum penna-marina 'Cristata'
Blechnum spicant (a)(ms)
Dryopteris affinis 'Crispa Congesta' (*)
Dryopteris filix-mas 'Crispa cristata' (*)(ms)
Dryopteris sieboldii (*)
Hypolepis millefolium (*)
Hypolepis millefolium 'rugosula' (*)
Onychium japonicum (*)(ms)
Paesia scaberula (*)
Phegopteris decursive-pinnata (*)(ms)
Polystichum setiferum 'Confluens' (l)(ms)
Polystichum setiferum 'Congestum' (l)(ms)
Polystichum setiferum 'Congestum Cristatum' (l)(ms)
Polystichum stenophyllum (*)



"I shall not indicate these localities. The general British public are not yet sufficiently trustworthy to be informed of the secret recesses in which Nature hides her treasures. Some years ago, I was thoughtless enough to publish one of these localities, and in a few months every fragment of the plant was gone. What selfish barbarian it was who thus robbed his neighbours, I have never discovered, but I hope the ghost of a Fern-Owl may haunt him till his soul grows kindlier".

Mott, F.T. 1889. *The ferns of Leicestershire.* Trans. Leicester Literary and Philosophical Soc. 12:25-28. *re* the distribution of *Nephrodium oreopteris.*

Apart from the beautiful prose of this curse, I was entertained by the idea of an owl with fronds and croziers instead of feathers and thought we might run a design competition in the Pteridologist. I've since discovered Fern-Owl is another name for the Nightjar!

JOSEPHINE CAMUS

Further Notes On Judging Fern Classes

A R Busby

As an afterthought to the article I wrote for last year's *Pteridologist*, I thought it might be useful to record the following points system for judging ferns. I am indebted to Jimmy Dyce for bringing this to my attention many years ago and, although it is not my intention to use such a system, it might prove a good indicator for would be fern exhibitors to understand the importance of the various factors mentioned.

Judging Ferns - Point Scoring System. (From *LAIFS* Vol.6, No.6, May 1979)

	points
A. Cultural Perfection - 50 points	
10% - Container	5
40% - Shape of fern (balance according to species)	20
30% - Fullness & balance	15
(Number of fronds in accordance with size and species)	
10% - Vigour of fern	5
10% - Size	5
B. Foliage - 25 points	
30% - Quantity (according to species)	7.5
30% - Vigour	7.5
20% - Cleanliness	5
20% - Freedom from blemishes	5
C. Difficulty of cultivation - 15 points	
100% - Very difficult	15
75% - Difficult	11
50% - Moderately difficult	7.5
25% - Easy	4
D. Correct and suitable labelling - 10 points	
15% - Suitable label (not detracting from fern)	1.5
70% - Correct name (exceptions made for nomenclature changes)	7
15% - Legibility	1.5

FIRST PRIZE, FIRST TIME FOR OPHIOGLOSSUM

BPS member, Linda Pickering of Market Weighton, Yorkshire put a pot of *Ophioglossum vulgatum* into the June, 1995 Alpine Garden Society show at Pudsey. It won first prize! It is thought that this is the first time that adder's tongue has ever been exhibited at such a show, let alone won. Congratulations to Linda on her success (see rear cover). *A nature reserve warden originally dug it up by mistake.*

Cyathea arborea at the roadside near Grand Etang

EXPLORING FOR FERNS IN GRENADA

Russell Beeson

Grenada is almost at the southern end of the Caribbean islands - only a few hundred miles from the coast of Venezuela. It is becoming an increasingly popular package holiday destination, and there are some excellent, if pricy, hotels in the southern and drier part of the island. Grenada is about 21 miles by 12 miles and generally mountainous, though the highest point, Mount St Catherines, is only about 2,700 feet in altitude.

Any fern enthusiast thinking of visiting the West Indies should consider Grenada, as in places it is brimming with ferns. Large tracts of the island are covered with more or less inaccessible rain forest. Most of the roads are lined with habitations, with banana plantations and other tropical crops, but the most spectacular road cuts through the centre of the island into some of the highest mountains, culminating in a crater lake, the Grand Etang, near which is a rather ramshackle visitors centre which forms a good base for walks into the forest and to the higher peaks and ridges.

Grenada is currently in the transition towards being a major tourist destination. The island is still geared primarily to the local inhabitants, and consequently there are almost no signposts on the roads, and nothing to tell you which village you are in. It is, therefore, quite difficult to find your way around without a

guide, and the only worthwhile map, a rather indistinct Ordnance Survey production, can only be obtained on the island (for example, from the Museum in St Georges). Nevertheless, the country people are very friendly and always willing to help you find your way about.

In a short family holiday lasting a week, it was not possible to see as much as we would have liked, and most of the places we did see were those most easily accessible by car and walks of an hour or so. The highest area, around Mount St Catherine's, is currently inaccessible except by those with plenty of time for long hikes with experienced guides. Nevertheless, the richness of the fern flora is immediately apparent as soon as one gets into the montane forests, and the highest forest areas that are easily accessible - the so-called elfin forests are indeed a ferny paradise.

At low altitudes there are few ferns, the most conspicuous being *Pteris vittata*, often seen plastered to walls and roadside rocks. A little higher up, *Pityrogramma calomelanos*, with its characteristic silvery farina on the reverse of the fronds, is frequent on clay banks and disturbed ground. *Polypodium aureum*, the hares foot fern, is quite common on roadside trees and rocks. As the road winds into the mountains the most abundant fern is the rather slender *Blechnum occidentale*, which hangs from all the roadside banks, with attractive pink young fronds.

Higher up, we quite suddenly came across quantities of *Dicranopteris pectinata* and *Gleichenia bifida*, which form immense thickets, with indeterminate growth, much like a delicate bracken. Often growing beside these two, on disturbed ground, is *Lycopodium cernuum*, an elegant trailing clubmoss. Occasional tree ferns, *Cyathea arborea*, are also seen, with slender trunks growing to about 3 metres.

From this level up to the highest areas, we see more and more of a very conspicuous fern, *Cnemidaria grandifolia* var. *obtusa*, with fronds often 3 metres in length. This fern sometimes forms short trunks and is indeed a type of tree fern, but is also abundant as just a mass of rich green fronds at ground level.

These high montane forests thrive in an annual rainfall of up to 4000 mm, and visitors must be prepared for frequent showers, though you soon dry out again in the tropical heat. The rain forest trees are spectacular, many with buttressed roots and hanging with lianes of various kinds. Tall palms and introduced giant bamboos are also common. In the higher forests, the trees, palms and bamboos, as well as the trunks of tree ferns, are covered with epiphytes, mainly bromeliads, small orchids and ferns in great variety. In the wettest places, epiphyllous mosses actually grow on the fronds of epiphytic ferns - almost a case of big fleas having little fleas....

The high elfin forest, also known as cloud forest, has the richest and most beautiful development of epiphytes. In these areas, for example on Mount Qua Qua, an hour and a half's walk from Grand Etang, the trees are stunted by the prevailing wind on the exposed ridges, and tree ferns are particularly common.

All tree trunks and branches are festooned with epiphytes. The ferns found here include many species of filmy ferns, *Trichomanes* and *Hymenophyllum*. It is particularly rewarding for a mainly temperate botanist, accustomed to the general rarity of filmy ferns in Europe, to see several species of both these genera growing in great abundance and luxuriance.

As well as filmy ferns, many species of *Grammitis, Elaphoglossum* and *Polypodium* are found as epiphytes, with *Nephrolepis rivularis* occasionally as well. Attractive club mosses carpet the ground, often running up the mossy trunks of trees; examples seen were *Selaginella flabellata* and *S. substipitata*.

The ground flora of the elfin forest includes the ubiquitous *Cnemidaria* described above, also the stout *Blechnum ryanii*, much resembling the *B. chilense* commonly grown in British gardens but with deep pink young fronds, and a number of species of *Thelypteris*.

This brief account does no justice at all to the various species of *Adiantum, Lindsaea, Asplenium* and other genera we found in these forests. The best, indeed the only, reference book for the ferns of Grenada is Flora of the Lesser Antilles, Vol. 2 (Pteridophyta), by George Proctor, a copy of which was kindly lent to me by Mrs Bridget Graham, joint author with Martin Rickard of a fascinating and learned account of a fern hunting trip to the Caribbean island of Nevis, published in the Fern Gazette in 1992. Proctor lists a total of 151 pteridophytes for Grenada. In my short visit I recorded 55 species, several of which are still subject to final identification or verification. Some specimens did not key out satisfactorily in Proctor, which is hardly surprising given the lack of serious botanising on the island.

Many ferns listed by Proctor as occurring on Grenada I did not see on my trip. For example, I was not able to see the robust mangrove ferns (2 species of *Acrostichum*) or *Danaea*, a species of which is reputed to be endemic to the Grand Etang area. Nevertheless, a surprising variety of ferns can be spotted in a short time. Many of these are of great beauty and interest and can only whet the appetite for a future visit during which I hope to be able to visit the more inaccessible areas.

Finally, a note for the faint-hearted: although walking in the montane forests is a hot and sticky affair, there are no poisonous snakes and biting insects seem rare, so there are few tropical hazards to endure. I will be more than happy to provide BPS members with full details of species seen and any other information about Grenada, if they care to write to me.

Acknowledgements

I am grateful to Martin Rickard and Bridget Graham for their encouraging correspondence, and particularly to Mrs Graham for the loan of Proctor's book, without which I would have been lost for many identifications. I would also like to record my thanks to Grenada's Director of Agriculture for permission to collect herbarium specimens.

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AIDS TO IDENTIFICATION

Dryopteris affinis: my view of the current situation

James Merryweather

Last year I resolved that the new-look *Pteridologist* would contain a section which confronts the identification difficulties which field fern hunters experience, whether they be new or experienced. Next year I hope to tackle the problems the beginner has with *Polysticum setiferum* and *P. aculeatum* in the absence of either. I have certainly found this to be one of the most difficult dichotomies to teach, though I and, I suspect most of us, can usually *do* them from some distance at a glance.

This year the priority has to be *Dryopteris affinis*, about whose five British morphotypes I've heard many grumbles: "When will *they* finally sort them out?" we ask. I've talked to a number of *them*, and have the message that it will not be for two or three years yet - if the task is straightforward, which of course it isn't! For this edition, I received Adrian Dyer's *crie de coeur* (page 25) which, I felt, addressed the problem from the point of view of the membership at large, even if the specialists (who have read it in advance) were unable to agree with all of his points. I have had a range of responses from those privy to it: the amateur pteridologist was delighted to see that a boffin, albeit not a professional fern taxonomist, had said in scientific language what they had wished to utter (except one, who finds the impossibility of *D. affinis* a challenge!). The scientists were divided: some thanked Adrian for his balanced and well directed challenge to the taxonomists and some found holes in his argument. One, in particular, dismissed it out of hand as sheer nonsense. Those at the centre of the problem who have the job of sorting out *D. affinis* in Britain were extremely helpful as well as, to my mind wisely in the circumstances, very cautious.

The trouble is that, although a deal of work has now been done on the morphology of *D. affinis*, it is far from complete. The authors of the familiar orange book most of us refer to for this fern complex (Jermy and Camus, 1991) courageously described five sorts of *D. affinis* but did not commit themselves to species, sub-species or any other taxonomically definite division. The breeding system of *D. affinis* is such that the five (or more or fewer) are not the result of normal sexual fertilisation, and botanical epithets are difficult enough to assign when breeding is simple. Thus the term morphotype was adopted, avoiding the need to say to which botanical rank each might belong.

Others have taken a different stance, but they were not right in the nervous hub of the taxonomic struggle. Clive Stace in his *New Flora of the British Isles* (1991) distinguishes only three of the morphotypes, but as subspecies: *D. affinis* subsp. *affinis*; *D. affinis* subsp. *borreri*; and *D. affinis* subsp. *cambrensis*. He includes *D. affinis* subsp. *robusta* in *D. affinis* subsp. *borreri*, with which the pundits tend to agree, and they also may call morphotype *paleaceolobata* a variety (var. *paleaceolobata*) of *D. affinis* subsp. *affinis*. Some may reject these (especially var. *robusta*) and other named varieties as expressions of normal variation. (Phew! - are you keeping up with me?).

The fact is that more data are required, so that information about the range of form in *D. affinis*, the distribution of its morphotypes and their Mantonian cytogenetics (chromosome counting and behaviour) may be acquired. In parallel, biochemists and molecular geneticists will look at differences in their chemistries, and enzyme and DNA 'finger-prints'. When all of this work is completed - and there can be no guarantee that, in the UK where pure research funding is paralysingly limited, the work will be paid for - then the picture may clarify; the mists will begin to clear and, hopefully, genetical relationships will be established so that ranks and definitive names can be allocated.....but don't hold your breath!

Meanwhile, we must persevere. From much correspondence and many telephone calls I feel I can distil for you some guidance for the 1996 season. Firstly, I recommend you get out your copy of the orangey-brown book, re-read the introduction to *D. affinis* and, in any way that you find comfortable, entabulate (with drawings) the important features of the five morphotypes as well as *D. filix-mas* and *D. oreades*. Determine exactly what features you need to look for, and the states of each. However, this achieved, you will have forced yourself to learn (I apologise, re-learn) *D. affinis* in depth and, perhaps that will help you to tell them apart more readily once you get out in the field.

What *I'm* going to do as well is keep at the back of my mind the notion that, although there are five (or, as the result of collecting through *Affinis Watch*, possibly more) equally unranked morphotypes, there may be (may be - might be - could be) **three which are especially distinct, are met with more frequently** and may deserve ranking as subspecies (or some might even count them as full species!). But I won't permit myself to think of them as three sub-species and one or two varieties - I'm sticking with those morphotypes.

There will soon be a new *Affinis Watch* newsletter. Make sure that you get hold of it as soon it's out, though don't expect *the* answer. There will also be record cards from the mapping project (page 33) which will help to collect and collate information. Don't remain discouraged, as I know a lot of you presently are. Keep recording *D. affinis* in the field and send your data and confirmatory fronds to *Affinis Watch*. The record (other than as simply *D. affinis*) is of little use to *Affinis Watch* unless it has been determined by one of the few egg-heads who really know which morphotype is which. A herbarium specimen lasts for centuries and can be referred to in the future as understanding of the *D. affinis* complex develops, and then reassessed.

The message must be: *courage, mes braves*. We'll get there, but only in the fullness of time. Please support the project to clarify the *Dryopteris affinis* complex in Britain, and be patient as the story develops. Things can only get better.

*Now, to the discussion. First Adrian's Dyertribe, in which he deliberately presented an extreme and very provocative point of view. With his blessing I sent copies to a range of pteridologists, professional and amateur, and awaited a response. Plenty of the latter wrote with their support, but I'm afraid there may have been a deal of "How the h*** are we going to react to this!?" rattling around inside museums and botany departments! Never mind, the outcome is - I think you will agree - very heartening. Clive's response, which may seem a little abrasive in parts, has been given a similar tone to "What should we do....." It's not a row: the authors are, after all, friends!*

WHAT SHOULD WE DO ABOUT *Dryopteris affinis*?

Adrian Dyer

I would like to suggest that all new fern floras and field guides should follow the example of James Merryweather's *Fern Guide* and omit all sub-specific taxa of *Dryopteris affinis* until we understand the underlying biology. In the past, each successive publication has presented a different treatment, changing not only the names but also the number and boundaries of the taxa, and implying that the previous treatments were inadequate, and the new one better. Thus, as time passes, extinct treatments fossilise and disfigure earlier floras while the latest treatment presents an impression of precision and accuracy which experience tells us will prove to be false as, yet again, difficulties are experienced in identifying specimens. There always seem to be specimens which do not quite fit any of the taxa, but overlap two or more. When experts are consulted, it is not unusual to get conflicting opinions, delivered with various degrees of confidence. All this indicates that we are not ready to publish taxonomic treatments within this difficult species (*NB. also Clive's main point - ed.*). An unsound sub-specific treatment that is also unreliable in practice is useless to the specialist, un-necessary for most field botanists and discouraging for beginners who feel that they should be able to identify all taxa in their flora.

I am not suggesting that the specialists should stop wrestling with the problem. On the contrary, further investigation is essential, but I doubt whether any amount of gazing at fronds will provide the definitive taxonomic treatment of variation within this heterogeneous apogamous apomict. As with all apomicts, the taxonomy will inevitably present difficulties and the situation is further complicated by the presence of cytotypes with different ploidy levels and by the ability to function as sexual males in inter-specific hybridisation. We need more information about the reproductive biology of the different forms before we can approach a meaningful sub-division of the species which allows reliable identification. When significant progress has been made, the names and keys should be published in a small booklet (by BPS), not in any flora covering all the British ferns. The booklet would be available to enthusiasts (masochists?) for use in the field, and could be easily modified and re-issued should that still

be necessary, but could be ignored by those for whom identification to species is sufficient.

That raises a series of questions. Before we worry any more about sub-divisions within *D. affinis*, can we be sure that we can always recognise it at the species level and accurately and consistently distinguish it from *D. filix-mas*? In many cases, the distinction can be confidently made on the basis of several frond characteristics, but what about those highly fertile plants with intermediate frond outlines and pinnule shapes? As a non-specialist I am often advised to take the dark spot at the base of the pinnule as the definitive confirmation of a

form of *D. affinis*, while the absence of the spot is an equally positive indication of *D. filix-mas*. Can I follow this advice, and is the character always reliable? Are there apomicts (presumably therefore *D. affinis*?) without the dark spots, or sexual plants (presumably *D. filix-mas*) that have the spot? Do hybrids between the two species always inherit the apomictic life cycle and thus produce a high proportion of viable spores, or are they distinguishable by their defective spores? Are the hybrids also always distinguishable by their higher ploidy level, or are some of the tetraploid (4x) and pentaploid (5x) apomicts pure *D. affinis*? Do we have the information answer these questions? Are there any other conspicuous and reliable characters that will invariably separate the two species? If there are no definitive characters which distinguish all forms of *D. affinis* from *D. filix-mas*, what are the implications for field records and distribution maps of these species?

A final question. If the taxonomic difficulties with *D. affinis* are largely attributable to apomixis, why don't we have similar problems with *Phegopteris connectilis*? According to Manton's *Problems of cytology and evolution in the pteridophyta*, 1950) this is another apogamous triploid (3x) species, with a life cycle similar to *D. affinis* and probably similarly contains genomes from two or more ancestral species. However, *P. connectilis* shows little variation. Not even the Victorian collectors, obsessed with searching for morphological variants, could find anything to enthuse about in this species. Moore, in his *Nature printed British ferns* (1859) states that it is not much liable to variation and,

later, Druery in *British ferns and their varieties* (nd) agrees that "this species has been very chary of varieties". This assessment has not changed during the 20th century. Manton (p. 186) says it is more uniform than *D. affinis* (as *D. borreri*). Page, in his flora *The ferns of Britain and Ireland* (1982), comments that this species is not very variable. This uniformity is not unique to *P. connectilis*. It is shared by several other other, sexual, species. It does, however, contrast markedly with variation within *D. affinis* which indicates the independent origin of several, perhaps many, distinct apomictic genotypes in that species. The absence in Britain of close relatives of *P. connectilis* no doubt prevents any complications resulting from recent hybridisation, but why hasn't apomixis resulted in the recognition of distinguishable morphotypes within this species, as in *D. affinis*? Is it because *P. connectilis* is usually sexual in Britain and the recorded triploid apomicts were exceptional? Is it because the species has not been so closely studied and a similar pattern and degree of variation exists but has not been recognised? Or is the species uniform, yet consistently apomictic, implying that we have in Britain few different genotypes, perhaps only one genotype, essentially a clone derived apomoctically from a single sexually-produced triploid of hybrid origin? If the answers to these questions are not already available, investigation is needed. Although molecular techniques would be particularly informative, BPS members could provide some of the information required. Any previously overlooked morphological variation would be revealed by careful comparison of fronds. Fairly simple microscopical examination of a fertile frond should reveal whether a plant is sexual or apomictic. Apomixis in both *P. connectilis* and *D. affinis* results in the formation of 32 spores per sporangium instead of the 64 typical of most sexual species. I would be happy to collate, and subsequently report on, any relevant observations sent to me.

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WHAT SHOULD WE DO ABOUT *Dryopteris affinis*?

A Response by Clive Jermy

I have been given the privilege of commenting on the paper by Adrian Dyer, who speaks from the heart as one who occasionally dons anorak instead of lab. coat and ventures out to collect fern spores, and who finds difficulties with sporophyte identification. As he suspects, he is not alone.

I would like to discuss two points. Firstly, writers of floras and field guides who present a new way of approaching an understanding of relationships between taxa (i.e. units of whatever rank from species to forma) *do not* necessarily imply previous treatments were inadequate and the new one *better* and, whilst one tries to be as *accurate* as possible, *precision* is a word one can use, maybe, when describing the shape of a prothallial cell, but not I suggest, when describing the gross and often variable morphology of a complex plant. The writers of any book designed to help people identify plants (or animals, for

that matter), especially in the field, have to communicate the jizz of the plant, that is characteristics of the plant that we see/feel/smell, then assess and relate to a known unit within our personal database i.e. our brain. To do this we use many and different techniques including text layout, graphics and photographs. It is not science. Books are also written for people of different levels of ability and experience. I think Merryweather, Page and Jermy & Camus each have something to give, and readers should not consider an earlier book as a fossil when a new one appears. I suggest that Adrian Dyer sticks with Merryweather's *Fern Guide* and gets to grips with being able to distinguish the common male fern before he proceeds further. It is clear, however, from the response to the Jermy & Camus *Guide*, that many botanists, both within the BPS and the BSBI, can see units of variation repeatedly appearing in the *Dryopteris affinis* complex and want to, and can, relate them to described forms.

Secondly, from the earliest times there has been a tendency for botanists to give names to plants, and the mid nineteenth century saw a boom of varietal and form names, and then later subspecies names appear in print, especially in European floras. The *International Code of Botanical Nomenclature* gives complex rules as to how to choose names and legally move them up and down the systematic hierarchy. Many, many names have been given to the variation seen in *D. affinis* (for the reasons given by Dyer) throughout its range. The world expert on the *D. affinis* group is Christopher Fraser-Jenkins, who has shaken the kaleidoscope of names more than most, and published his wide-ranging views, but not even he has the answers to the complete problem. Adrian Dyer puts his finger on the problem: "in this apomictic group do we understand the relationships between these taxa sufficiently to allow us to put rank (species, subspecies, variety etc.) to them?" The answer is *No*, and this is why Jermy & Camus used the term 'morphotype' (which has no nomenclatural, i.e. legal, significance) when describing what we saw as variation, although we did relate them to the Fraser-Jenkins concepts, of the time.

The evidence is accruing, however: Mary Gibby's cytology, Carl Widén's (Helsinki) chemical work on phloroglucinols, the potential of enzyme and DNA analysis, and the detailed morphological analysis and field trials made by Anthony Pigott. In the meantime, and during the next few years whilst we map the British Fern Flora, the answer to the question raised by Adrian Dyer, and many others in the society, as to what names we should use is seen in our new recording card for the mapping project. Here we (as do the BSBI in their own mapping programme) follow Clive Stace's *New Flora of the British Isles* and list three subspecies names (*affinis, borreri* and *cambrensis*) as being the most obvious and common taxa. But we emphasise in our mapping project Newsletter (available from the BPS, see page 33) that there are other recognisable varieties, which it may be both practical and biologically pertinent to map eventually, and that Anthony Pigott and myself would like to see voucher fronds of anything recorded. Our views on ranks will not be decided until more work on the NHM programme has been completed.

Please send *Dryopteris affinis* records and fronds to: ***AFFINIS WATCH***
c/o Clive Jermy, Botany Department, Natural History Museum, London SW7 5BD

Further discussion of this topic will appear in *The Fern Gazette*, vol. 15, part 3:
"A reaffirmation of the taxonomic treatment of *Dryopteris affinis*" - CR Fraser-Jenkins

TWO SONGS OF THE WAIKATOS TRIBE OF MAORIS

1. Ngeri mo te Roi

Heaha he kai ma taua
He pipi, he aruhe
Ko te aka o Tuwhenua.
Ko te kai i ora ai te tangata
Matoetoe ana to arero
Te mitikanga, mihe arero
Kuri au, au, au.

1. Song for the Fern Root

What shall be the food for us two?
Some pipis and some fern root:
That root which spreads
throughout the earth.
Ah! 'tis the food which revives man,
Roughening his tongue
as he rolls it over in his mouth;
Rough it grows as the tongue of a dog,
Yelp, yelp, yelp.

The fern root referred to is the rhizome of *Pteridium esculentum*

2. Ngeri mo te Mamaku

He mamaku, he mamaku,
He kai ma Tarao
E Kore koe e karangatia
I te tau o te hope motuhia.

2. Song for the Mamaku

Some mamaku, some mamaku,
A food for Taroa.
We won't call you with the usual
cry of welcome for a stranger,
In this the season when we almost
cut ourselves in two with bands tied
round the loins.

Mamaku is the mucilaginous pith of the black tree-fern, *Cyathea medullaris*

Quoted from **Potts, T.H.** 1882. *Out in the open: a budget of scraps of natural history gathered in New Zealand*. Christchurch.

NOTE - Hooker says that the edible fern root (*Pteris esculenta*) of New Zealand is a mere variety of our common brake that used to be the favourite food of the New Zealanders and was celebrated in song. The young women, in laying before travellers baskets of cooked Fern-root, chanted, "What shall be our food? Shall it be the shell-fish and Fern-root? That is the root of the earth: that is the food to satisfy a man". - Edwards, Z.J. 1866. *The ferns of the Axe and its tributaries*. Hamilton, Adams and Co., London. Now I know why the All Blacks have a fern for a logo.

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Equisetum x *trachyodon* IN ICELAND

Heather McHaffie

During a visit to Iceland in July 1992 I was struck by the abundance of both *Equisetum variegatum* and *E. hyemale*. Of the two, *E. variegatum* was slightly commoner, growing in the vegetation covering old lavas and in short turf, found both on the hills and near the sea. *E. hyemale* was seen less frequently but was most conspicuous on exposed eroded areas where it was often the only plant, with the possible exception of of *E. variegatum*. In Kristinsson's Flora (1987) he has a distribution map showing that *E. hyemale* is found less often in the interior and he also mentions that it grows in woodland, a habitat which is not mentioned for *E. variegatum*.

I expected that the hybrid, *E.* x *trachyodon*, would be widely distributed due to the frequency with which the parents were growing close together. However, I only found it at one locality, in the species-rich birch (*Betula nana*) woodland at Skaftafell, Lat. 17° 03' Long. 64° 01' near the south coast. Here I found it at two points some distance apart. This either represents a widely dispersed colony or possibly the occurrence of hybridisation more than once. Specimens have been placed in the herbarium at the Royal Botanic Garden, Edinburgh.

In The Botany of Iceland (Gröntved 1942) there are references to two other places where the hybrid has been found, at Goðaland* and Arrnarvatnsheiði.* Both are further east. There was also one other possible locality which I have not personally verified. The apparent lack of frequency of this hybrid raises questions about the conditions necessary for hybridisation to occur. Due to heavy grazing there is little natural woodland left. The Skaftafell hybrid population was in mixed woodland, although the canopy rarely exceeded two to three metres. I have no information as to the habitats in which the other two definite records were found. Populations of the two parent species were often in exposed, eroded areas where they may have been spreading vegetatively. Possibly the hybrids occurred at a time when conditions were less arid, such as would be possible in a woodland environment.

References

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Kristinsson, H. (1987). *A Guide to the Flowering Plants and Ferns of Iceland.* Örn og Örlygur Publishing House.

* the ð is pronounced 'th'.

THE TALE OF TEN SPOROCARPS

Heather McHaffie

A few years ago, I was particularly interested in *Pilularia globulifera*. This unusual little fern has a creeping rhizome with rush-like leaves and sporocarps containing two kinds of spore, attached the the rhizome. At the end of 1988 I regularly visited a population of *Pilularia* on Loch Tummel, in Perthshire. In August, there were many sporocarps visible, but by the end of October most had either become detached, or possibly been eaten. I collected ten and placed them in a damp polythene bag in the fridge. With only this very small sample, I conducted a few preliminary experiments at room temperature to investigate the longevity of the sporocarps.

On the 4th of December, 1988 at 2 pm I took two sporocarps out of the fridge and placed them in water. By 8 pm, one had split into four neat segments, but it was not until five days later that jelly began to extrude from the sporocarp. In the morning only microspores were within the jelly, but by the evening the larger megaspores were beginning to emerge. When some were placed some in a ring on a microscope slide, the male gametes were seen swimming about and concentrating around the necks of the megaspores. 21 days after first being placed in water, a single root and shoot had emerged from each megaspore. The second sporocarp did not split until it had been immersed for 17 days, and it was a further 7 days until the jelly began to emerge. The megaspores were subsequently fertilised.

At the beginning of February, 1989 one sporocarp was dried and left in the garage for a month, and one was placed in water. The latter split within 3 days and eventually produced fertilised megaspores. The dried sporocarp was placed in water after 30 days and took 26 days to release the jelly. Green shoots were eventually produced. This indicated at least a short term ability to withstand drying. In April, two sporocarps in a positively wet part of the bag were found to have split in the fridge and the jelly had been extruded. They were placed in water but left in the fridge. Eventually they were brought out to the light in June, but failed to fertilise. The remaining four sporocarps were intact and one was put into the deep freeze for a year. Removed on the 30th of March 1990, jelly was extruded by the 4th of April and green shoots visible by the 15th. This was a relatively fast response and could indicate that freezing promotes rapid growth in the early Spring.

Two more sporocarps placed in water in May 1989, took 13 days to reach the green shoot stage. The final sporocarp in June took 14 days. As the sporocarps received only natural daylight, the faster development of the later 'sown' sporocarps could have been influenced by the longer day-length.

Campbell (1888) stressed that the sporocarps must not be allowed to dry out if they are to germinate. He envisaged that the sporocarps would lie around for some time before decaying enough to admit water. As the water enters, the mucilaginous lining swells to split the spore further. Then the jelly emerges bearing the spores. The microspores have a very small internal gametophyte which produces only male gametes. The megaspores grow a small gametophyte containing a single archegonium on one end of the spore (Christensen, 1938).

I met with no success in attempting to grow the fertilised megaspores beyond the early stages. They were laid on wet Loch Tummel mud standing in different depths of water but they floated off if it was too deep. It would be interesting to hear from anyone else who has succeeded. Vegetative fragments, which I have seen detached by passing ducks, root readily into a tray of compost standing in water. They make rapid growth and produce sporocarps if not too shaded.

References

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Christensen, C. (1938). Chapter 20 Filicinae pp 529 - 530 in *Manual of Pteridology* (Ed. Verdoon, Fr.) Martinus Nijhoff, The Hague.

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ONE GOOD FERN DESERVES ANOTHER

I (ed.) discovered this poem in a collection of pun-filled, word twisting biologically correct ditties by American lepidopterist John M. Burns. I wrote to the publisher on 1st December, 1993 requesting permission to quote it in *Pteridologist* but received no reply. I still want you to read it (delight in it or groan, depending upon your innate reaction) so I will print it for you and risk the consequences. I offer as recompense to both author and publisher the following review: *BIOGRAFFITI a natural selection* by John M. Burns is a truly excellent book. Buy it immediately! (and help protect your editor from the U.S. legal system). Published by W.W. Norton & Co., New York and London, ISBN 0 393 00031 1. Paperback.

Prothallia of ferns are always haploid
Producing sperms and eggs that seize the procreative role
When, of a dampness, they unite to form a diploid.
Up springs the frondly sporophyte,
with rhizome, root, and rachis
And a meristem that's apical and tight.
It uncoils; but on a leaf that is preparing for meiosis
Sporangia in clusters make a very sori sight.

A NEW EDITION OF THE FERN ATLAS

Anthony Pigott

In 1978 the British Pteridological Society and The Botanical Society of the British Isles (BSBI) jointly published the *Atlas of Ferns*, consisting of maps on an A4 format for 98 species and hybrids of pteridophytes in Britain and Ireland. The BPS has for some time considered publishing an update of this work in some form, and have now decided to prepare an illustrated book on the geography and ecology of *Pteridophytes in Britain and Ireland* containing discursive text with distribution maps of varying scales, using GIS and other techniques to correlate habitat with ecology (climate, geology, vegetation type etc.). The BSBI has launched a similar project (*Atlas 2000*) which is to update the *Atlas of the British Flora* (Perring & Walters, 1962) - which includes pteridophytes - in the next four years. As with the earlier fern atlas, we shall be making use of the records on the National Database at the Biological Records Centre (BRC), Monks Wood and its Irish equivalent in Dublin.

Over the next few years the BPS will organise field meetings specifically to map unworked areas, or carry out detailed surveys. We shall be working with Irish, Scottish and Welsh botanical groups whenever possible. All records will be deposited with the BRC (or the Irish equivalent) with both of which we shall work closely, thereby contributing to *Atlas 2000*. We will be maintaining a mailing list of those willing to help; not only do we need helpers in the field but also people willing to put records into the computer (your own into a given format, or to help the staff at BRC to get back records entered into the national database. It is not only unworked areas that we are interested in. Lowland, highly populated areas have bridges, churches and other walls that may have polypodies and spleenworts that may turn out to be new records. We shall also issue periodic newsletters which will contain identification guides to difficult taxa (e.g. *Dryopteris affinis* group) and hybrids (of e.g. *Equisetum*), and notices of special or extra workshops, field meetings, joint BSBI meetings etc., to which all project workers are welcome.

In order to take the project forward the BPS Committee has set up a subcommittee under the convenorship of Anthony Pigott and consisting of Rob Cooke, Tom Curtis (Ireland), Clive Jermy, Heather McHaffie (Scotland), Gavin Stark, and Barry Thomas (Wales). The BPS hopes it can contribute to *Atlas 2000* and can work with others to increase our understanding of the distribution of ferns and allied plants in Britain and Ireland and, in so doing, further the aims of the Society.

If you want to hear more or keep in contact with this worthwhile project, please write to the British Pteridological Society (Mapping Project), Natural History Museum, Cromwell Road, London SW7 5BD (fax 0171 9389260). Or phone Clive Jermy on 01959 523654 or Anthony Pigott, on 01992 552269. Up-to-date information on the project will be available on the BPS bulletin board on the World Wide Web shortly (see Editorial, page 49).

DEN REISENDE BOTANIKER I NORGE

James Merryweather

I toyed with the idea of packing my copy of Benjamin Ølgaard's wonderful *Ferns of Scandinavia*, but it's a huge tome and too heavy an addition to the luggage of a flying wait. Perhaps I should explain: I'm a member of a renaissance band called The York Waits, and we had been employed to entertain the Vikings on their home territory. I had to transport a case full of renaissance woodwind instruments, a large book of music, a tudor costume and clothes etc. for a week. The fern book was out of the question, and I had to be satisfied with a mental list of what I might see, and leave it at home.

There wouldn't be much time for botanising but, in a new country, I was going to do my best to get out there and see what I could find. I love travel, and become as excited as a ten year old with a new computer game when I arrive in a new place. Tightly wedged in the minibus, being ferried from Vaernes airport to Trondheim, I pressed my nose to the window as the the new scenery and ferns flashed by. From the start we passed the fringes of coniferous forest and I could see the odd shuttlecock, but identification at speed was impossible. On the road margins I could pick out patches of *Equisetum arvense*, but then, before I had been in Norway a fair time to expect the unusual, there was a very different horsetail with branches held more or less horizontally, yet it did not have the hazy appearance I would have expected if it had been *E. sylvaticum*. Blimey, it must have been *E. pratense*, one of Britain's rarest horsetails! Before long, we'd raced past several more similar patches. I began to wonder if our rarity would turn out to be a common Norwegian weed.

Soon we arrived in the city which was to be our home for the coming week, a trap for the aspiring pteridologist, who had to resign himself to urban botanical exploration. The first fern I encountered, I found below one of those pavement grills which let light down to basement windows. With luxuriant lady ferns there was a plant of *Gymnocarpium dryopteris*, another of which I found on an impressively large tomb in the graveyard of the Nidarosdomen, Trondheim Cathedral. Also in the cemetery were huge lady ferns and what I supposed to be *Dryopteris filix-mas*, though I sensed they were somehow different from any found in Britain, but there wasn't anything *D. affinis*-ish about them.

We performed our main concert soon after arriving and, after a couple of jolly out-door sessions at the west end of the cathedral, we were sent by rail, north to

Stickelstad where we were to give another concert. The train clattered along the wriggly fjord coast and passed through forest and tempting rocky cuttings, but the distant view was all I could grasp at train speed. We passed through a village called Hell and were able to accuse those whose backs were to the engine of being *dragged backwards through Hell*. Of course, by the time we'd returned to Trondheim, we'd all been *to Hell and back!*

When we arrived at Verdals station there was no-one there to sort us out and no way, as foreigners, we could rectify the situation. Had it been winter, that little station would have seemed very bleak, remote and lonely. Eventually a dour and disinterested young man with a minibus taxi drew up, and we strolled over to see if he had anything to do with six English musicians. He muttered an affirmative grunt and mutely conveyed us to Stickelstad where he turfed us out at a folk museum and roared off. The place was absolutely crawling with bloodthirsty-looking Vikings in full war gear and gruesome make-up. They were local villagers preparing to rehearse the annual performance of their epic play about the downfall of St Olave in 1097 - Stikelstad's Oberammergau.

We all sat about dejectedly, hoping that sooner or later someone might turn up to tell us what to do. The Vikings very wisely ignored us, so bored, frustrated and inquisitive, I wandered off to see if I could find any point of reference. However, this was countryside, and I soon found what I shouldn't have been looking for, a bank ab-so-lute-ly covered in *E. pratense*. I became engrossed with camera and horsetail and soon lost touch with reality. By the time I'd satisfied my lust for illustrative material I realised that I was entirely alone, so I gave up pteridology for the moment, and went to join my colleagues, noting that I was ignoring a fern which I did not recognise at all. Surely, I didn't walk away from *Diplazium sibiricum*. No, utterly unlikely, but what else would I have totally failed to recognise? Too bad, I was there to do music, not ferns.

We were eventually rescued by a charming Irene (her badge said so, Irene, that is) wearing a very fetching red bodice decorated with white Nordic circle patterns which provocatively emphasised the contours of her chest. She led us away from the folk museum, where we shouldn't have been at all, the few hundred yards to the Arts Centre. We passed loads of magnificent lady ferns and then, by a stream below a bridge, gorgeous *Matteuccia struthiopteris* which is native in Scandinavia.

Our concert venue was ultra-modern, terribly designed-in-Scandinavia and very draughty, for it had no walls. The audience was tiny (about ten) but enthusiastic, and the remuneration, adequate enough to encourage us to give a good concert (mind you, as I write, we haven't yet been paid).

The same dour minibus driver as fetched us took us home along the fjord into a fabulous, long-lasting, purple sunset. I managed to wake the whole party by letting go of my beer bottle with a crash as I, like the others, nodded wearily.

We settled into a further four days of out-door playing and processions (the musical side of the story, with incomprehensible allusions to Norwegian pteridology, may appear in another journal) and I patiently waited for Saturday,

our one day off. Local maps showed a single tram line which left the city to climb uphill to a place called Lian which appeared to be rural. I decided to risk my spare day on a trip there, hopeful that I would reach real Norwegian fern-filled countryside.

First I had to find presents to take home for my two beautiful, but thoroughly unpteridological daughters. One, I knew would favour an ethnic trinket with a Nordic-cum-celtic feel to it. I found the ideal craftsman, sporting the sort of colourful skirted outfit we associate with reindeer herding laplanders, who was manning a stall full of hand-carved bone and antler jewellery. The other got one of the irresistible cuddly Elks* which were for sale all over the city. That evening, at a restaurant which boasted "Bear when available" on the menu, I feasted voraciously, if insensitively, on Elk steak!

Duty done, I boarded the tram to Lian and was trundled through city streets, past turf-roofed timber houses and into forest for a very reasonable 14 Kroner (about £1.50). I never did see any ferns in the luxuriant grassland ecosystems which adorned so many roofs, but I don't doubt they were there somewhere, for every roof garden was a different, often extremely colourful, flowery mead or early birch forest succession.

At Lian, just within the forest, the tram track described a wide loop for the return to Trondheim. I disembarked and ploughed briskly off through the trees where I discovered a beautiful lake, around which there was a network of woodland walks. I walked, leaving the crowds behind. Yes, there were people up there, Norwegian families out for a picnic and a bathe in the lake which they used for their pleasure, but with little impact. Away from the bathing area, large parts of the lake margin were taken up with sedge fen, bog-bean rafts or familiar forests of *E. fluviatile*, and the effect of tourism was negligible. Such a place in the UK would probably have been wrecked. My circumnavigation had plenty of delights, for botanical surprises cropped up regularly as I strolled in the hot sunshine (but not so hot as in England - remember July, 1995?). Zoology impinged on my peaceful stroll too. At one point I was rooted to the spot by fearsome chattering from a red squirrel who, far from scared, descended his tree to tell me just what he thought of me, face to face, before angrily scurrying back into the high tops.

As I walked into the forest of assorted pines and spruces I encountered carpets, yes carpets, of oak (*G. dryopteris*) and beech ferns (*Phegopteris connectilis*) with *Blechnum spicant* and enormous *E. sylvaticum* which, I had already noted during my journey, was a rampant weed by the tram track.

My camera clicked away, almost wastefully. Soon I crossed the first of the several streams which fed the lake. I could sense the presence, among the willows, of *D. carthusiana*, or could I dare hope for *D. cristata*? Well, the substrate was obviously nutrient rich, but the indications were that it would be a tad too acid for those ferns.

What I actually found was my first buckler fern, but it, and all of the many I found later, was not *D. dilatata*, which I might have expected to find in such

* I called it Miss Ann Elk after the Monty Python character ("I have a theory that is mine, that it is"), but Liz soon re-christened it Aka, after the Greek dish.....*groan*.....Moose-aka!

country at home, but *D. expansa*. Last time I saw this fern - or did I? - I was in the company of Jack and Marjorie Garstang of the North-West BPS group, and those present will probably still remember the arguments! We were so hoping to find it in Cumbria, and may have done, but were never certain of the diminutive individuals we encountered. We argued and hoped, but I still say, Jack, that we never really found it there. In Norway there was no doubt, even of the small, rather yellow specimens growing in the stark sunlight. The rachis scales were pale without a hint of the stripe of *D. dilatata*, and the lowest pinnae highly asymmetrical, just as in the book. The best of them were truly magnificent, well over a metre high and so obviously different from our common old broad buckler (see cover).

They say that travel broadens the mind. I soon accumulated a number of new thoughts inspired by my first visit to Scandinavia. I've often been aware that my view of the British flora is biased by common species and the rarities I've known in the places I've lived in or visited frequently. Thus, I consider *D. expansa* to be a rarity, yet there are vast areas of Scotland where I've never been. If, in those places *D. expansa* grows as it does, say in Benlister Glen (or was it the aptly named Glen Rickard?) on the Isle of Arran where I *have* seen it in plenty, then it's nowhere near as remarkable a find in Norway as I felt it was. Its all relative.

Another thought I came away with was that beech fern here was so much tougher than in the U.K. (above - see also page 27). It was altogether a really robust fern, the fronds taller, thicker and stiffer than I'm accustomed to.

Flowering plants also surprised me, though I bet that, through ignorance, I missed some botanical gems. Still, I was aware of a *Polygonum* species with spikes of white flowers, and occasional 30 cm high specimens of one of the wintergreens *Pyrola* sp. But what did take my breath away - or should have done, had it not been well past its main flowering - was that English rarity dwarf cornel (*Cornus suecica*) just everywhere, I tell you.

On completing my walk around the lake my lust for the out-doors, nourished by the restrictions of my musical responsibilities, was nicely satisfied. During those

few hours at Lian I'd been amazed, astounded, surprised and delighted. I couldn't take any more and I wanted one of those terribly expensive, cool beers before a pleasant walk home. On the way to the restaurant nearby I stopped a while at a gorgeous hilltop meadow full of the biggest harebells I, or you I warrant, have ever seen. Now, my daily toil has me researching a root symbiosis of our favourite wild flower, bluebell, and a slide of the Scottish "bluebell" would be very handy. I lined up the most dramatic and artistic of shots but the camera failed to function. The wretched batteries had run out, so that was unequivocally that, and beer the only reasonable *sequitur*. Even then I was entertained on my hot and weary way uphill to refreshment, by an enormous greater butterfly orchid (*Platanthera chlorantha*).

That cool beer (øl) was at last purchased for the equivalent of more than £4 per pint! I sat on the high veranda and contentedly surveyed the landscape beyond my lake at Lian. To the left, in the distance, was Trondheim and its dramatic fjord, and to the right.....good grief, a pair of ski jump ramps dominated the horizon. Idle thoughts of our heroic Eddie the Eagle and other pleasant irrelevances drifted through my relaxing mind until I was obliged to rise stiffly to my feet and set off to trudge back through wooden suburbia to the big city, and that delicious elk steak (an original way of avoiding mad cow).

FERN CULTIVAR NAMES

Martin Rickard

At first encounter, fern cultivar names seem a little strange. Hopefully this is a short-term sensation, but if not, maybe a few comments explaining the system will be helpful. The word 'cultivar' may also seem a little strange, but this is a term coined to distinguish between a botanical variety found in the field (var.) and a variety cultivated 'in captivity' (cv.).

Latin-Greek names for cultivar names have been used for nearly as long as Latin-Greek epithets have been applied by botanists to plants at the species level. During the middle of the last century, with the explosion of interest in ferns and their varieties, new names appeared in profusion. Fortunately, a logical system emerged which allowed a certain amount of information to be gleaned from the name, even without an accompanying description. Today's method of naming cultivars has evolved from the Victorian system.

In 1959 a new law on cultivar naming came into force. This decreed that new cultivar names must be in a living language, i.e. outlawing the use of Latin and Greek. The emphasis here is on the word new, i.e. named since 1959. Unfortunately this divide breaks the continuity between old and new names. However, a compromise system, within the laws of the 1959 code has been proposed by Peter Barnes. This is fully in *Pteridologist*, 1988, **1**(5) 192-195.

In short, Peter's proposal was: where a new crested cultivar can no longer be named legally, for example 'Cristatum Jones', it could be called (Cristatum

group) 'Bill Jones'. A bit of a mouthful, but more often than not, a newly raised form would not merit a full cultivar name, so the new plant can legally be referred to as - Cristatum group, retaining continuity with the past and giving the plant a name readily understood by most fern growers.

This new group naming system makes sense and is working well in practice. The following list explains the meanings of some of the most commonly used names:

Descriptive names in general use:
Capitatum - tip of the frond crested. Commonest in *Athyrium filix-femina.*
Cristatum - tips of fronds and pinnae crested. Very common.
Percristatum - tips of the fronds, pinnae and pinnules crested. Commonest in *A. filix-femina* and *Polystichum setiferum.*
Grandiceps - crest at tip of frond wider than the frond lamina. Common.
Corymbiferum - crest at head of frond broadly bunched, i.e. three dimensional, Commonest in *A. filix-femina.*
Ramosum - frond rachis branched.
Cruciatum - pinnae branch at junction with rachis giving a criss-cross effect along the frond, e.g. *A. filix-femina* (Victoriae group), *P. setiferum* (Wakeleyanum group).
Laceratum - frond margins lacerated, i.e. deeply and irregularly incised.
Semilacerum - half of frond lacerated, e.g. *Polypodium australe* 'Omnilacerum'.
Plumosum - frond very feathery (usually sterile). Applied to many species, always of the best cultivars and usually uncommon or rare, e.g. *A. filix-femina* 'Plumosum Drueryi'.
Foliosum - frond very feathery (usually fertile), e.g. *P. setiferum* ''Foliosum Walton'.
Lineare - pinnules very narrow, e.g. *P. setiferum* 'Lineare' syn. 'Confluens' (pinnules flowing together).
Angustatum - frond narrow, e.g. *Dryopteris filix-mas* 'Cristato-angustatum'.
Congestum - rachis or pinna midrib shortened causing overlapping of pinnae or pinnules. Common.
Revolvens - lamina or pinna rolled backwards. Usually in *Dryopteris affinis.*

Non-descriptive names in general use:
Pulcherrimum - most beautiful. Applied to a range of cultivars in different species because of their great beauty and usually uncommon or rare.
Cambricum - from Wales.
Cornubiense - from Cornwall.

Names usually, but not exclusively, applied to *Asplenium scolopendrium*:
Crispum - frond undulating like an Elizabethan ruff. Frequently the frond is thin and usually sterile.
Undulatum - Similar to 'Crispum', but the frond is of normal thickness and generally fertile. There is an 'Undulatum' form of *Osmunda regalis.*

Names used exclusively for *Polystichum setiferum*:
Acutilobum - pinnules undivided except for possibly the basal lobe. Pinnules leathery and acutely angled at base as well as acutely pointed at tip.
Divisilobum - as 'Acutilobum', except pinnule divided.
Multilobum - as 'Divisilobum', except pinnules soft textured and pinnule divisions are broad, not acutely angled at base.
Plumoso-divisilobum - a feathery form of 'Divisilobum', pinnae overlapping towards base of frond. Often called plumoso-densum. Not common.

For much more information on the subject of fern cultivar naming see the BPS's excellent Special Publication No. 2 *Fern Names and their Meanings* by **J.W. Dyce** (1988), available from BPS booksales at £4.

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ENCOUNTERS WITH THE DUNGAVAN HOOPER & GLOOSCAP

Ted Munyard

September 1993 found my wife, Thea, and me in Maritime Canada. Our base for a couple of weeks was Blackville on the Miramiche river. This part of New Brunswick is almost wall to wall virgin woods, the main highways are frequently along river valleys and what others there are exist mainly to get from one part of the province to another. Habitation is generally ribboned along the highways, with townships having developed where highways intersect or where bridges cross rivers.

Driving along the highways, as one seems to do a lot in Canada, I was struck by the wonderful variety of ferns which grew in profusion at the road sides. I soon found that I was confidently naming the species, even at 80 kilometres per hour. The easy ones were, *Matteuccia struthiopteris, Onoclea sensibilis, Pteridium aquilinum,* not unusually as common as the preceding two, and a perky little frond, light to yellowish green with each frond arising separate from its neighbour, forming large patches several yards in extent. These I later decided with the help of Broughton Cobb's *Field Guide* was probably *Dennstaedtia punctilobula.* Another one to get my attention had a very *Osmunda*-ish look about it but all will be revealed in time.

Criss-cross through the woods is an ever extending network of 'dirt tracks'. This maybe does not do these important 'byeways' justice as they are as wide as many 'A' roads in Britain, all be it that the surface is sand, stone and crushed rock. Credit is due to the 'Lumber Jacks' for these wonderful means of access to the woods, and my thanks are due to my nephew George, and as he is employed in the lumber business, what to him was no doubt a busman's holiday was to me an exciting and rewarding adventure. He had planned on his day off to take his Uncle Ted into the woods to look for ferns, and to see a couple of other things he thought would be of interest to me.

Our first visit was to see the grave of the 'Dungavan Hooper'. The story goes that many years ago a group of timber men were camped in the woods where they were cutting and the cook was known to be a thrifty man who carried his accumulated wealth in a money belt. The boss of the gang, being consumed with greed, instigated the murder of the cook, stole the money and he and his accomplices buried the body by a tree. It is claimed that at night the 'Whooper' can still be heard wailing for revenge on his attackers and the return of his money. The site of this grim crime has recently become resurrected and attempts are being made to put it on the tourist map, although I must say we required a four wheel drive truck to take us most of the way and the last half mile or so was on foot through thick woods. At the site is a crude sign inscribed 'THE GRAVE' a small clearing marked 'THE CAMP' and a spring bubbling

up through the ground 'THE SPRING'. What really impressed me were the large areas of various clubmosses which were growing everywhere, the cones of which were more numerous than on the trees that surrounded them. This abundance occurred wherever I went in the woods. Species identified were *Lycopodium clavatum* and *L. annotinum*, and a real *beauty* at another site later in the holiday.

A hundred miles or so from this first site came our second objective, 'Sheep Brook Falls'. This lay to the north east, and is another remote tourist site which was doubtless found by the timber workers as they cut their logging roads through the woods. It must be at least 50 miles to the nearest 'civilisation' and a site which has remained virtually untouched due, according to ancient legend, to 'Glooscap' who was, and perhaps still is a mythical god of the Indian tribes of the area. Part man part god, he is reputed to be of enormous stature, as were the animals of the world in the far mists of time. Squirrels were as large as bears, the deer could with ease browse the tree tops and the beaver was big enough to dam the largest of rivers. Glooscap would stroke the animals and they would diminish in size under his hand until one by one they became the size we know them to be today.

Anyway, back to Sheep Brook falls. A pioneer found these falls and decided that it would be an excellent place to build a cabin and farm the land but, unfortunately, before he could get started, winter snows closed in and soon he had run out of food. He was in a desperate condition when along came Glooscap. The man pleaded with the Indians' god for help and Glooscap being a benevolent man-god, said he would help the man if he promised not to change the land but to leave it as he had found it. The man agreed and made the promise. Glooscap then instructed the man to follow the brook and he would find food enough to see him through the storm. He followed the brook and soon came upon a second falls which tumbled into a deep hollow and there, trapped in the hollow, were several lambs which gave the man the meat he needed. His strength regained, the pioneer left the place to find some other land to grow his crops and build his home. This second falls is today called Lamb Falls. It is due to Glooscap that I was able to find, identify and photograph those vaguely *Osmunda*-ish ferns. They were of course *Osmunda claytoniana, O. cinnamomea* and the one I did know, *Osmunda regalis.*

Our Canadian adventure was exciting and rewarding: rewarding O.K., but why exciting? Well the answer to that was in the date, Saturday 25th September. In New Brunswick the 23rd, 24th and 25th of September 1993 was the moose shooting season and, believe me, it's very, very exciting to venture into the woods when you know there are a couple of thousand trigger happy moose hunters on the loose, with a license to kill (moose). The only doubtful protection one has available is to wear orange clothing, mine was a waistcoat. I suppose it's a controlled cull really as there are only a set number of licences issued on a lottery basis. I understand that some 1,700 odd moose were shot (legally) during those three days, I saw three, one was in the back of a pick-up truck (shot) one was in the Nova Scotia museum Halifax (stuffed) and one about two weeks earlier browsing in a swampy area south of Bathurst. I do hope she got away.

To end on a botanical note: in the grounds of a golf course in Doaktown N.B., in some woodlands by the drive up to clubhouse I found the little *beauty*, the clubmoss I referred to earlier. Up till then it had been just another illustration in

a fern book: the tree clubmoss *Lycopodium obscurum*, which bears an uncanny resemblance to a miniature pine tree.

Regrets? Just a few. I would have liked to spend more time in the woods, preferably with a fellow pteridologist. The time of year meant that spore collecting was more or less out of the question, most had dehisced by then, and it would have been satisfying to have brought a plant or two home. My ambition now is to recreate that little burn by the bridge with its three *Osmunda* species in sufficient numbers, established in my garden, but that will take time. The sign on the covered bridge, a reminder of the days of horse drawn transport was maybe trying to tell me something. It said: "No Faster Than A Walk".

TED MUNYARD

📖 BOOK REVIEW 📖

THE FERN GUIDE *by James Merryweather, illustrated by Michael Hill, 2nd edition, 1995. ISBN 1-85153-211-0. FSC Publications, Preston Montford, Shrewsbury SY4 1HW, £6 inc. P&P, paperback.*

The first printing of this excellent key was so full of gross and minor printing errors, including a mistake which led to an incorrect identification, that it was difficult to recommend it when I reviewed it in 1994. However, the second printing, with 98% of the errors corrected, has been available since mid-1995 and, although I still have a few quibbles, they are minor ones and I now have no hesitation in recommending this guide for beginners with its ample, high quality line illustrations. A few additional illustrations and also distribution maps for the three *Polypodium* species have been added. Some of the colour photographs at the end of the book, especially the poorer ones, have been changed for ones of better quality, though not neccessarily the same species. An excellent buy.

JENNIFER IDE

STORAGE OF *OSMUNDA REGALIS* SPORES

Peter Hainsworth

The spores of *Osmunda regalis* appear to be viable for only a few weeks under the usual dry storage conditions, but tests over the past few years have shown that if kept cool, moist and dark, they would keep for some months, over winter at least, which is all that is required for most purposes. So a trial was set up, treating the spores in various ways to find a simple way of keeping *Osmunda* spores viable.

Fertile fronds were collected on 10 August 1994 and kept between sheets of smooth paper until 16 August. Some spores were sown immediately to check viability - which was good. The remaining spores, mixed with various materials and subjected to a range of treatments, were put into 1 ml screw-topped plastic tubes, with the tops left loose to allow air to pass (which may or may not have been necessary). The tubes were put into small, self-sealing envelopes with a few drops of spring water to maintain humidity. One tube of spores was put into an envelope without water and placed in the fridge (approximately 4-5 °C). The remainder went into a tin box in an out-door shed over winter, with temperatures around 4-8 °C most of the time). Samples were sown on 23 March 1995 in sterilised compost, the pots kept together in a polythene bag and put in a propagating case with the temperature around 15-20 °C. Germination was assessed subjectively on 9 April 1995. Treatments and results are detailed below:

Treatment	Germination Assessment
1. Sieved dry black peat mixed with spores and moistened.	1
2. Sieved dry fibrous upper peat with spores and moistened.	3
3. Coir fines with spores and moistened.	5
4. Sieved garden compost with spores and moistened.	5
5. Hard, sterile laboratory paper, wetted and sprinkled with spores.	3
6. Dry spores stored in a tube, unsealed in a polythene bag in fridge at about 4-5 °C.	5

The treatments gave good germination except for the black peat (which was rather poor, perhaps because the material had been used in previous tests). To my surprise the best germination was of spores kept dry in the fridge and I had sown them rather thickly because I did not expect them to germinate. Incidentally, part of the hard laboratory paper dried out during storage. There was no germination on this piece - only white dots of mould - which suggests that constant moisture is essential.

There was quite a lot of material left over, so the experiment was repeated on 19 October to see if any spores were still viable. Only a few germinated from most treatments, and numbers seemed even further reduced a few weeks later. I

suspect the activity of fungus gnats a few of which were subsequently found in the polythene bag. These creatures seem to be able to find their way even into a folded poly bag! However, there was one outstanding exception. The spores sown on moistened laboratory paper came up thickly. I can offer no explanation for this and can only think that it is connected in some way with the sterility of the paper. The spores kept in the unsealed tube in the fridge did not germinate, but promptly turned into white dots. Presumably dried out, under the microscope they appeared misshapen. The generally poor germination seems to indicate some reaction between the spores and substrate, perhaps bacterial or fungal. The temperatures of an exceptional summer did not affect the spores on paper. I should now try keeping them dry in a moistened envelope which would seem to be the simplest of all options.

On the allied subject of spore germination from soil spore banks: our local botany group ventured into a sea cave on the coast of Easter Ross last summer. On a ledge we found what I would swear were one year fronds of *Asplenium scolopendrium* in a cluster. No parent fern was in sight, though it has been recorded about a mile away. The few other ledges were colonised by tufts of grass, but this one appeared to have been stripped, possibly by deer, perhaps eighteen months previously. No-one has been back yet to check the plants identity, but there is reason to believe that there must have been a harts tongue there previously.

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🕮 BOOK REVIEW 🕮

BRACKEN: AN ENVIRONMENTAL ISSUE *edited by R.T. Smith & J.A. Taylor. From: Working Papers Secretary, School of Geography, University of Leeds, Leeds LS2 9JT. Pp. vii, 227, numerous charts and illustrations, A4. ISBN 0 9525505 0 4. Paperback UK: £29:95 overseas £32:00 inc. P&P.*

This arrived during *Pteridologist* editing so it was useful that I'd had a *very* brief preview in order to arrive at the conclusion that this conference report is of great interest, and well worth reading. It consists of papers presented at the conference BRACKEN 94 (University of Wales, Aberystwyth. 18-21st July, 1994) and reports the research on a wide range of bracken topics (Evolution, genetics and global distribution; Ecology, physiology and remote sensing; Climate, sporulation and environmental change; Human and animal health; Control and management) presented by all the familiar names in the business: Stuart Lindsay, Liz Sheffield, Rob Marrs, Malcolm Press, Adrian Dyer, John Digby (well, I know him: he's one of my pals at York), Ralph Kirkwood, Chris Page and many others.

If you're really turned on by bracken, then I recommend you invest in this informative and very imaginatively designed book. Those with a passing interest should ask their library to get hold of it and have a browse. This is a fascinating, if common and troublesome fern, but we always have questions about it and some of the answers are here. I believe the price may have been reduced (☎ 01970 828436).

JAMES MERRYWEATHER

CONSERVATION

The status of ferns and fern allies in Great Britain

Rob Cooke
BPS Conservation Officer

At the last AGM it was agreed that I would write an article for *Pteridologist* each year on an aspect of pteridophyte conservation. Over the last couple of years the distribution of our native fern species has been reassessed, and this seems an appropriate starting point. The table below gives the current status of our least common species. Forthcoming articles will discuss issues relating to specific species.

Nationally Scarce Pteridophytes*	**Red Data Book Pteridophytes****
Adiantum capillus-veneris	*Asplenium trichomanes*
Asplenium obovatum	subsp. *pachyrachis*
subsp. *lanceolatum*	*Athyrium flexile*
Asplenium septentrionale	*Cystopteris dickieana#*
Athyrium distentifolium	*Cystopteris montana*
Dryopteris submontana	*Diphasiastrum* x *issleri*
Equisetum pratense	*Dryopteris cristata*
Equisetum variegatum	*Equisetum ramosissimum# @*
Gymnocarpium robertianum	*Isoetës hystrix*
Isoëtes echinospora	*Ophioglossum lusitanicum#*
Lycopodiella inundata	*Trichomanes speciosum#*
Lycopodium annotinum	*Woodsia alpina#*
Ophioglossum azoricum	*Woodsia ilvensis#*
Pilularia globulifera	
Thelypteris palustris	

* Occurring in 16 - 100 ten km squares, (Stewart et al 1994)

** Occurring in 15 or fewer ten km squares (JNCC, in prep)

@ It is not yet clear whether *Equisetum ramosissimum* will be included as, although it qualifies, it is believed to be an introduced species.

Listed on Schedule 8 of the Wildlife and Countryside Act, 1981 (those plants considered to be under extreme threat, and therefore strictly protected). *Gymnocarpium dryopteris, Lycopdiella inundata, Pilularia globulifera, Polystichum lonchitis* and *Trichomanes speciosum* are similarly protected in Northern Ireland (Schedule 8 of the Wildlife (Northern Ireland) Order, 1985)

Both *Asplenium trichomanes* subsp. *trichomanes* and *Polypodium cambricum* were previously thought to be nationally scarce but are now known to be commoner; *Cystopteris montana* was considered to be nationally scarce but is now a Red Data Book species.

This is all very well but what are we going to do about the continuing declines in some species? One of the answers may well be the UK Biodiversity Action Plan (1995) which sets out the actions (and money) needed to conserve, and in many cases restore our most important habitats and species.

Ferns and fern allies are important components of many habitats, and might well be expected to benefit from, for example, schemes to restore limestone pavements. Additionally, several pteridophyte species are targeted for specific action. These species are those which are globally threatened, species whose range or numbers have declined by more than 25% in the last 25 years or species listed under national or international legislation (Bern Convention, CITES and EU Habitats and Species Directive).

Pteridophytes listed in the Biodiversity Steering group report (1995) are *Athyrium flexile* and *Trichomanes speciosum* (plans written); *Lycopodiella inundata* and *Woodsia ilvensis* (plans to be written within the next three years), and *Cystopteris dickieana*, *Equisetum ramosissimum*, *Hymenophyllum tunbrigense*, *H. wilsonii*, *Isoëtes hystrix*, *Ophioglossum lusitanicum*, *Pilularia globulifera* and *Woodsia alpina*.

The government are due to respond to this report in the next couple of months. The indications are that they will look favourably upon it, although it remains to be seen where the money will come from! (The costed plan for limestone pavements alone comes to £360,000 to maintain and enhance 1,600 ha by the year 2010). It would be interesting to hear how fern conservation is being addressed in other countries. (*letters please - ed.*)

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HMSO (1995) *Biodiversity: The UK steering group report,* Volume 2: Action Plans. HMSO, London

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🕮 BOOK REVIEW 🕮

***INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS**, 1995, prepared & edited by P. Trehane (and an editorial committee). xvi + 175 pp. 21 Nov. 1995. Quarterjack Publishing, Wimborne, UK. Pbk, ISBN 0 948117 01 X. Price ?£18.50.*

This book contains the Principles, Rules and Recommendations that govern the naming of what might be called 'man-made' plants, i.e. the cultivated variety or cultivar, and follows both in format and style its counterpart for legalising the Latin names of wild plants, the International Code of Botanical Nomenclature. There are some 16 important changes in this edition over that last published in 1980, and they are summarised in the Preface.

As previously, cultivar names must be in a common language, but now must not be translated, although those in other alphabets (e.g. Japanese names) can be transliterated according to international standards. A point that editors must remember is that the abbreviations 'cv.' or 'var.' are not to be used. As from 1st Jan. 1996, new cultivar epithets must consist of no more than 10 syllables and no more than 30 letters or characters overall. One point which is clearly stated is that if a botanical type is considered to represent a cultivar, as in *Polypodium cambricum* where Linnaeus described the lacerated sterile form from a cliff in South Wales that has become a well-loved plant of fern growers, the name of the wild plant must remain unchanged but the cultivated element must be given a new cultivar epithet. We know already that *P. cambricum* being the earliest name must replace *P. australe*, a change which in itself causes confusion, but to change the cultivar name will be 'adding insult to injury'.

One welcome addition is the inclusion of an article on Designation of Standards. A Standard (equivalent to a type specimen for Latin names of species) may be a herbarium specimen, a photograph or painting, or an illustration previously published if that is all that is available. The BPS could make a positive contribution by getting together in one place (e.g. NHM or Wisley) a collection of such reference material for at least those many 'varieties' described by British pteridologists.

There are 12 Appendices of useful information including a glossary and a directory of International Registration Authorities in which one for ferns is, of course, absent. There is also a guide as to how these IRAs should function. App. XI is a bibliography to Checklists of cultivated varieties (under genus except for ferns which are all together under that heading). R. Maatsch's (1980) *Das buch der freilandfarne* (Berlin: Paul Parey) is the most important entry for ferns. Others are David Jones' Encyclopaedia and John Mickel's Ferns for American Gardens. It is interesting to note the Australian Statutory Registration Authority has published a checklist of *Blechnum* cultivars.

This may not be a book for every fern grower but all should ask their public library to have the book on their shelves. Those interested in the history of cultivar names will want their own copy.

CLIVE JERMY

EDITORIAL

Readers who are looking to *Pteridologist* (or anywhere else, for that matter) for guidance on the identification of that most troublesome of fern complexes *Dryopteris affinis* should turn immediately to page 23, but please don't get over excited. There are some comforts on offer, but *the answer* will still be some time in coming.

1995 may go down in history as the year when the specialist fern grower met real competition from the big guys. Not only were garden centres selling a few fern species and varieties (sometimes even correctly labelled!) but B&Q entered the market with bargains which our grower members will be hard pressed to match. Our York branches had smallish plants of a wide range of ferns for sale throughout the summer - they suffered dreadfully in the summer heat, but I guess such a big firm allows for such losses. Towards the end of the year I discovered they had some large pots of magnificent *Polystichum tsus-simense, P. polyblepharum, Dryopteris erythrosora, D. wallichiana, Cyrtomium falcatum,* and a crested *Dryopteris* they had labelled as *D. affinis* 'The King' (but I'm not convinced it was the real thing). I presume these were imported from mass producers in Holland, and I regret that this may represent unwanted competition for our own prize winning specialists, but it must be a symptom of an, albeit temporary, increased public interest in ferns; no big business survives on taking risks. B&Q, I am convinced, did the market research and decided to invest in what they considered to be a predictable, profitable market. If the interest is out there (Radio Times plant of the week 20-26 April was *Athyrium nipponicum* 'Pictum'), the BPS should be doing its utmost to increase the membership, and informing a wider audience of the existence of a huge variety of fine ferns, and our members' nurseries where they can be purchased.

I have news of two modern ferneries. The President writes:

> Glasgow Botanic Gardens are in the process of reviving and replanting the Victorian Fernery. As far as possible, documented material is being sought for this project. It is hoped that this will be a valuable teaching and conservation collection in the garden and expand what is already an extensive fern collection into the hardy species. Any help in sourcing material, native or foreign, would be appreciated. Please contact P Matthews, Curator, Glasgow Botanic Gardens, 730 Great Western Road, Glasgow G12 0UE (P&P will be refunded).

Also, York is to have a fernery at the Victorian cemetery, in recent years revived by a board of trustees (they bought it for £1), and the scene of several gardening, conservation and educational projects. Jack Bouckley and I are behind the idea and the area has been most imaginatively designed by our own landscaper Neil 'Capability' Timm. We're getting some help from the Leeds and District BPS group as well as a lot a brick and stone from the cemetery itself. Any spare ferns you may care to donate, please share with Glasgow. Part of the idea is to feature the ferns to be found in and around York of which, for an urban area, there are remarkably many (11 so far). I'm so keen on the idea I've bought my own plot, amongst the graves of many old York worthies and within the fernery itself where, in the fullness of time, I feel confident I shall spend a rewarding eternity, studying fern roots and their symbiotic fungi from the most appropriate perspective - from below ground!

Two finds have given me a giggle of late. Somebody showed me the gardening column of the Sunday Telegraph Magazine (October 29, 1995) in which Ursula Buchan relates a remarkable (I don't think) observation: *We all have tales to tell each other this autumn of the recuperative nature of plants, which have revived, seemingly miraculously, after the summer's drought. My boastful tale concerns the common polypody,* Polypodium vulgare, *a fern which, without reference to textbooks which say that it grows in moist soil and semi-shade* (which textbooks? - ed.), *has for many years flourished in the dust which lies between the layers of a dry stone wall, in full sun. In early September, the fronds were twisted, crisped and brown. Within a fortnight of the first rains, fresh lush green fronds were unfurling all along the wall as if it were spring. Beat that if you can!* Well done, polypody, but I think old rusty back and many other ferns could show you a thing or two about drought tolerance.

Next, I found among my younger daughter's immense collection of costly cosmetic concoctions a product from Yves Rocher called ***CONDITIONER PHYTO ACTIF*** *with Equisetum extract.* Now, I have a healthy scepticism of these preparations, which are given the air of being caringly manufactured by white coated scientists in centres of high fashion: Paris - London - New York. The name *Laboratoires Garnier* sums up both images so succinctly in just two words, very clever marketing dreamt up by the pin-striped denizens of the board-room. Every aspect of the label can be seen to have been designed down to the last detail of type-face, emphasis and devastatingly careful wording. Our horsetail preparation contains not only 5% Equisetum Extract, but an additional 0.1% Larch Sap whose efficacy is not alluded to, but "it must be good for something", the unwitting teenager will subconsciously infer.

What does Equisetum Extract do? *The Phyto Actif Conditioner helps condition your hair* - well, a conditioner should - *and leave it tangle-free* - hyphenated to show that tangle-free is a semi-technical term. *On application your hair is protected from external pollution* - the thought if *internal* pollution in my beard gives me the creeps - *and regains its suppleness, softness and healthy appearance* - which it had lost?

Now get this: *Renowned* - yes, renowned - *for its strengthening and softening properties, Equisetum helps protect the hair and reawakens its natural beauty.* On what authority do they quote this *well-known* lore? I'd have thought that if you vigorously rubbed juice squeezed from a horsetail into your hair the suspended silica bodies would soon grind it away. Perhaps it was secretly added to conditioners I used to use until 1988, when it became obvious I no longer had enough hair left to produce my customary pig-tail. Naw, they say baldness is a sign of virility. I microscoped a sample of *Phyto Actif* - no silica.

The *World Wide Web* or *Internet* soon is to carry information about the BPS. For those who have yet to 'surf' I should explain that, *via* the international telephone network, computers all over the world are able to communicate with one another, and people can write to each other by electronic mail (*E-mail* as its affectionately known) or design information bulletins which others can load into their computers and read. These are not dull black and white text, but full colour presentations with lots to read, splendid diagrams and photographs, and buttons to press (on screen) which enable you to move to further detail or other related pages. For instance, if you dial up the address:

http://inet1.inetworld.net/~sdfern/

you will find the San Diego Fern Society in a page set up by Robin Halley. By pressing buttons you can find out a lot about the fern biology and pteridoculture. Anthony Pigott is going to enable us to do the same thing. Soon the SDFS, the BPS and other fern societies around the world will have their web sites interlinked in a vast network through which pteridologists can share their enthusiasm for the subject. You'd be surprised how many people are already using this means of communication, and it is inevitable that there will be many, many more, but be assured that it will be some time before this publication is exclusively available on the WWW, as are some newsletters I have to read!

We now have a Conservation Officer, Rob Cooke, who will not only work actively on all aspects of pteridophyte conservation on our behalf, and in liaison with other plant conservation bodies, but he will report to the membership annually in this magazine (see page 45). Since we now have such an office, I think we will have to be even more careful about the way we treat our native species and be diligently conservation-minded when purchasing ferns from abroad. I urge you to look again at Yousef Cardinouche's article last year about the tragic rape of the ferns of Mauritius.

In preparing this edition, I thought it wise to edit out a paragraph by one of my authors who carelessly wrote of having found an unusual fern which he dug up and took home. We simply do not do that these days! Ferns can be properly collected as spores or photographs.

The next paragraph of this editorial I have thought it wise, at the last moment, to axe. I originally wrote, few holds barred, of my strong feelings about an aspect of foreign fern import which has worried me all winter, but about which I have not had the courage to speak out for fear of imposing discomfort on old friendships. I think it is best that I engage in a little investigative journalism and get the facts absolutely straight before going to press, but the discussion will have to be opened in one way or another, because it highlights a conflict between horticultural and the conservation interests which, in a society like ours, should be as one.

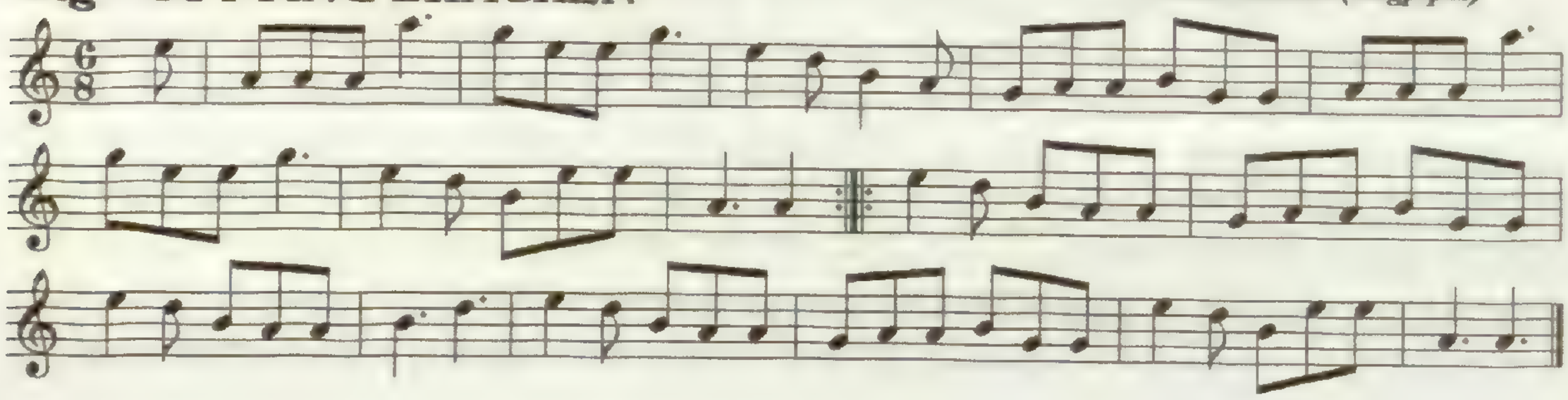
There will, of course, be another *Pteridologist* next year, but it requires your best literary efforts to make it. As you can see, we now do colour, but I had precious few decent photographs this time, and couldn't use my budget to best effect, so send plenty of your best photographs in future. Please send me articles as soon as you can, to add to those few which didn't make it this time - too late, you see.

So, on a happy final note, I offer you an old Scottish jig to play on recorder, clarinet, violin, tuba or any instrument you have to hand - even bagpipe - and I'll see if I can find another fern-allied tune for the next issue.

JAMES MERRYWEATHER

Jig - CUTTING BRACKEN

Trad. Scottish (Bagpipes)



LETTERS

Polystichum drepanum - A Request

I came across this request in a recent BGCI (Botanic Gardens Conservation International) newsletter. This species is not in Rush, but has featured on the past spore lists as *P. drepannun* (*sic*).

Jean-Yves Lesouef of the Conservatoire du Brest, France would like information on *Polystichum drepanum.* In recent years, 1994 and 1995, botanists have been unable to find the plant in Madeira and so it is possibly extinct. Over the last two years Lesouef has, with difficulty, propagated 150 plantlets from a sucker collected in the Ribeiro do Inferno in 1979.

If anyone has or has had this species in cultivation he would like to hear about the methods of cultivation used and the origin of the material. He would like to improve the genetic basis of his cultivated plants and would be very grateful for any living material of the fern. Please write directly to M. Jean-Yves Lesouef, Conservatoire du Brest, Vallon du Stang-alar, 52 Allée du Bot, F-29200, Brest, France.

***MIKE GRANT**, 366 Hurst Road,*
W. Moseley, Surrey KT8 1QN

One Man's Greenery

A man and his wife were out for a car ride in the country, he driving, she navigating, when the dreaded thing happened - a blow-out. They both got out of the car and looked at the front off-side tyre with utter disbelief. "Well", stated the irate wife, "you are a complete ass. I told you there was a fork in the road". Ridiculous, you may say, but read on.

For many years now, a lovely little limestone fern looking like a maidenhair spleenwort as far as shape goes, but with a totally green rachis instead of black, has been sought, examined and admired by all who enjoy the wonders of the pteridophytes. This little fern has, for many decades, been called *Asplenium viride* or the green spleenwort. It was referred to by this descriptive name by many fern lovers of the past such as Hudson, Bolton, Lowe and about twenty five other famous names, but around 1990 this little beauty ceased to be called *A. viride* by a few and became *Asplenium trichomanes-ramosum*, apparently because a certain Linnaeus called it that many years ago.

Ramose means forked. *A. viride* has a beautiful straight frond and is certainly not forked. It is quite true that Stansfield found a variety at Todmorden which he called *Asplenium viride* 'ramosum' because it was a forked green spleenwort. At Feisor in the Yorkshire Dales I have found an exceptional population of similar ramose specimens. I have spoken to many BPS members and only a handful call it *trichomanes-ramosum*. The remainder, including authors of certain fern guides, justifiably prefer *viride*.

It seems that the argument in favour of *trichomanes-ramosum* is that the great Linnaeus called it that first, so it must be correct! But, this man called *Hymenophyllum tunbrigense Trichomanes tunbridgence*, *Cystopteris regia Polypodium regium*, *Blechnum spicant Osmunda spicant* and *Woodsia alpina Polypodium fontanum.* He was not always first with the 'right' name.

Why has our beloved *Asplenium viride* now been called by a name which certainly does not convey a true meaning, and how long will it keep this ridiculous name before the taxonomists change their minds and the name? They should be aware that hundreds of people will continue to call this plant *Asplenium viride* and only a minority will use the new/old name. There is little wonder that those other than the taxonomists in the thick of nomeclatural change consider fern names are in a mess.

When I really think about it, I am convinced that if I had a frond of this fern in my hand, the only way I could convince myself of its ramoseness would be with the aid of a tot or two of strong tipple. Perhaps that country road should be referred to as "unclassified ramose lane".

***JACK BOUCKLEY**, 209 Woodfield Road,*
Harrogate, N. Yorks. HG1 4JE

Hartstongue Heaven

As a hartstongue enthusiast, I am lucky to live in West Sussex where the chalk land helps to make good habitats for *Asplenium scolopendrium.* In Arundel there are high banks shaded by trees which stretch for over a quarter of a mile with thousands of cascading hartstongues. I have spent many hours searching these banks, but I have

found very few plants which differ from the normal. I have found this disappointing because the old fern books of Lowe and Moore give descriptions of extraordinary finds in this area.

Recently, I was advised by friends to take a look at a ruined cottage and its outbuildings at the edge of a nearby wood. I could not believe my eyes; it was hartstongue heaven. The brick and flint cottages had lost their roofs and there were trees growing in the middle of rooms. The damp walls had hartstongues and tangled tree toots hanging from them.

Old fern books mention that hartstongues attain great size when growing on the inside of a well. This site had its own well with and hartstongues. As if this was not exciting enough, I began to notice that most of the fronds had various degrees of cresting.

Amongst the rubble I noticed one plant had a short marginate-cornute frond. Close inspection revealed that most plants had one or two fronds which were crested, muricate, undulating, reniform etc., but most fronds were normal.

***TIM BROCK**, 89 Highfield Road, Bognor Regis, W. Sussex PO22 8PD*

A New Approach To An Old Meeting

If, like me, you occasionally read through your Bulletin back numbers and a particular account of a meeting makes you think: "I wish I had been on that one". If perhaps it happens to be the one I helped organise in the 1990 season, then, just maybe, we can do something about it.

I refer to the National Field Meeting to North East Scotland reported in the Bulletin volume 4 number 1. I finished my account of that meeting with the words "will ye no come back again" and, since issuing that invitation, I have joined the privileged ranks of the happy and contented retired. Now, during the summer, the main demand on my time is for the development and maintenance of my ample garden.

As it would appear to have been a successful and productive week (41 ferns and allies) I thought some of you might like a second chance to cover the same ground, and I certainly would have no objection to doing it again, several times if required, that is with the possible exception of day 3, Glen Callater, I am after all 6 years older now.

If the idea has appeal and the regular meetings don't fit in with your holiday availability, I would be pleased to offer myself as guide, when it suits you. We can visit the interesting localities of that meeting and see if we can find something missed in 1990. During those months when the garden has first call on my time, just as long as I can keep up with the grass cutting, I would be pleased to be at your service. If the response to my suggestion is good I could perhaps cover the ground two or three times during the season and hopefully some members may manage to come the same week and we can then make it a *mini* meeting.

Old friends from that 1990 meeting are of course most welcome if they want to do it all again! I have adequate space for a caravan here at 'The Ferns' if required. But accommodation at Dinnet might be an advantage and save much travelling, as I am approximately an hour from there.

I still have copies of the original *prospectus* for the meeting and would be pleased to send on if requested.

***TED MUNYARD**, 'The Ferns', Hillbrae, Methlick, Ellon, Aberdeenshire AB41 OHE.*

AUTHORS

Please read and follow ***Instructions To Authors*** on page 299 of last year's *Pteridologist*. Mimic, as far as possible, the style of *this* edition and stick to the conventions discussed. Please, please, please write in good English, check what you have written before you send it to me, and see if you can get it onto a **PC** floppy disc (I can take Apple-Mac, but not Amstrad PCW). Keep the material flooding in with good colour photos.....and send it *soon*, not at the last minute!

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JUN 18 1996

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